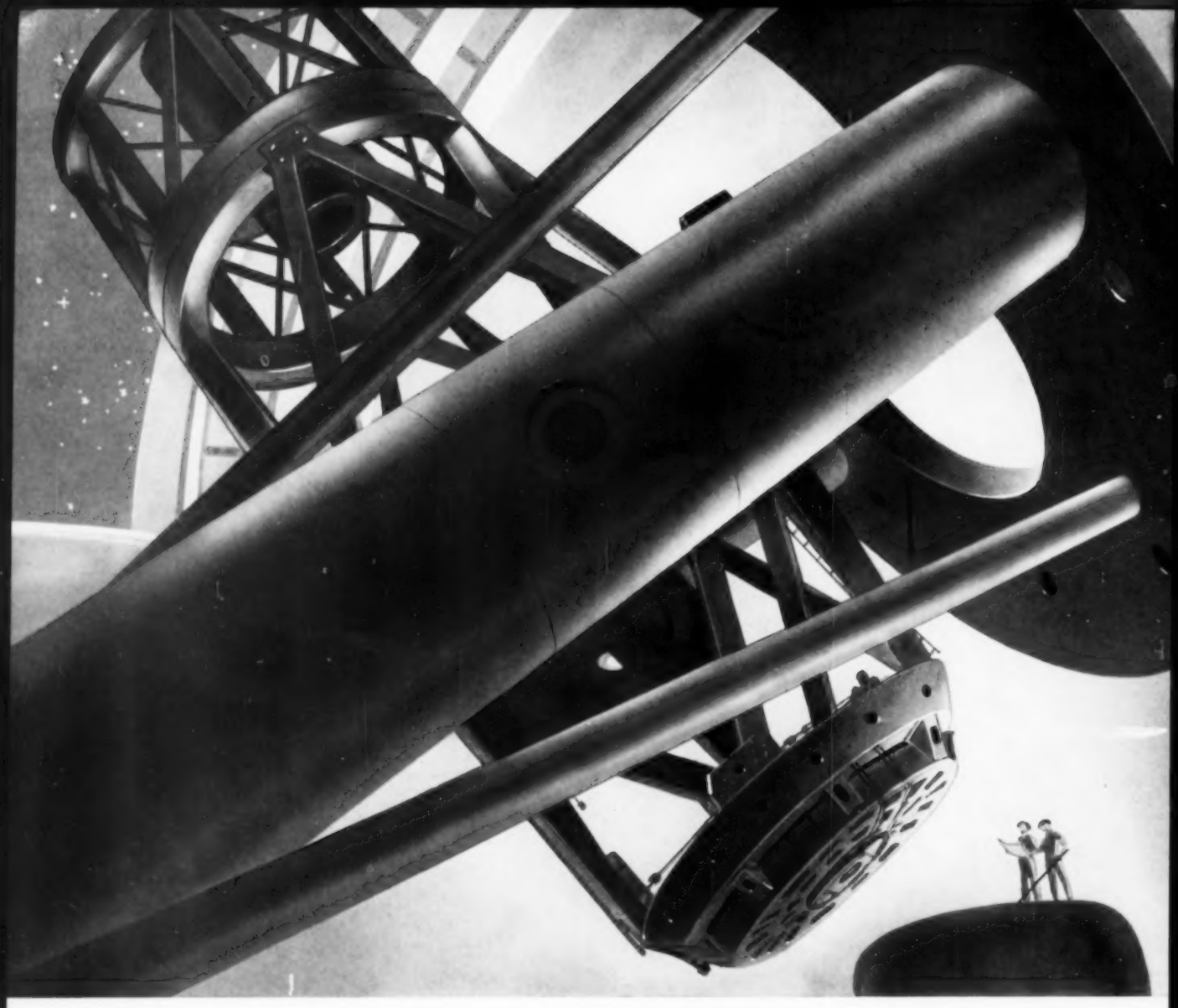
June, 1958 Vol. 47 No. 6

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine

AVA PRECONVENTION NUMBER



Pioneers of the universe

The scientists' search for knowledge of the universe has proceeded at an unprecedented pace during this 20th century. Their mighty telescopes have pushed back the shrouds of the unknown many *billions* of miles into space. But who are these scientists? One thing is certain. These pioneers of the universe are yesterday's youth. But more than that, they are those fortunate few in whom the spark of achievement was kindled into a flame so that their work might transcend anything the world has ever known before.

These are important facts for the youth of today who yearn for a life of success. The ability to rise above the ordinary is not a happenstance of birth or superior energy. It is most frequently merely a matter of ideals. Somewhere during the formative days of youth comes a turning point wherein the man of tomorrow clears his thinking, begins to train himself in weighing values, starts a lifelong discrimination between the good and the shoddy which so definitely marks *every* man who rises to great success.

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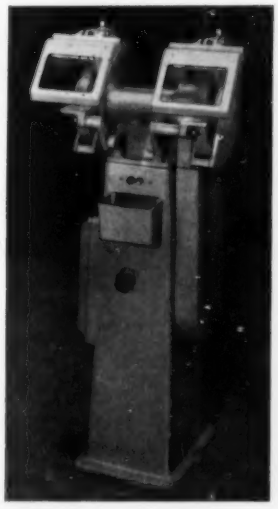

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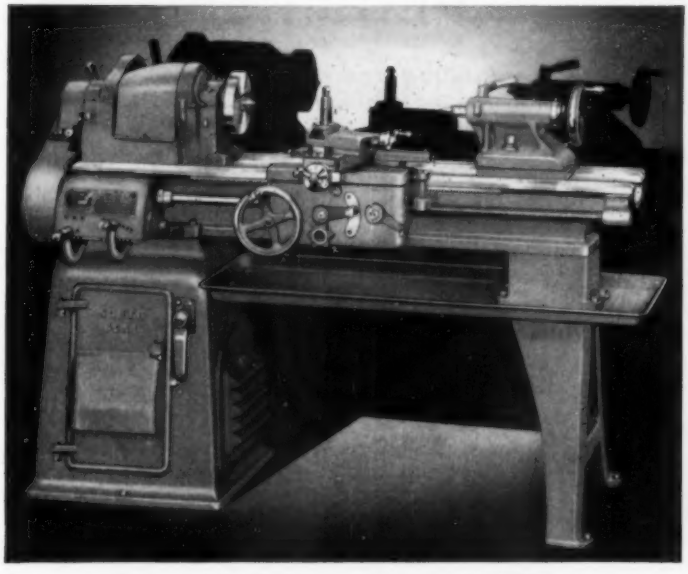
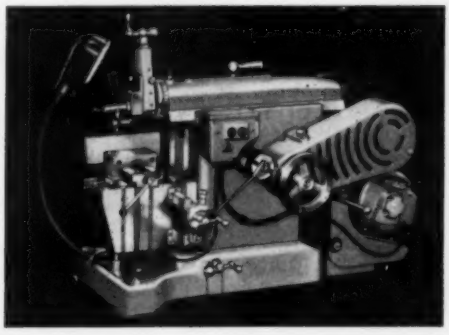


13" x 5' South Bend Engine Lathe (less chip pan and electrical equipment) f.o.b. factory..... **$1733**



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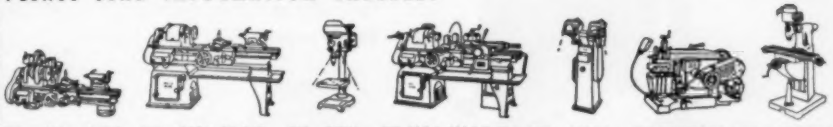

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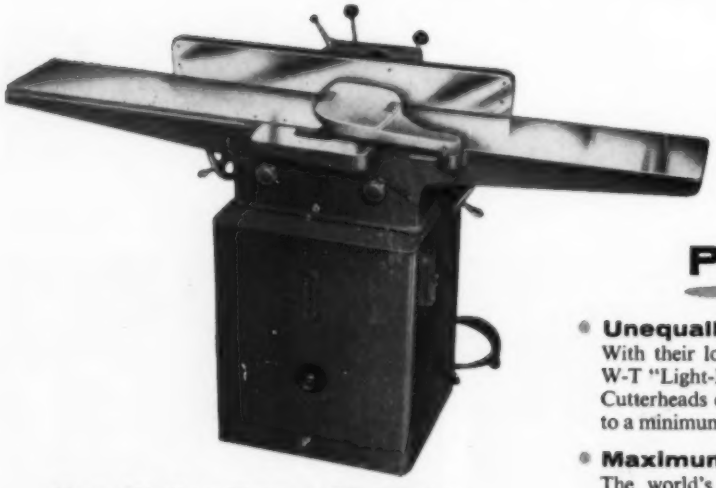

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JUNE
1958

VOL. 47 NO. 6

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

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This Month's Cover

The picture on our June, 1958, cover shows William McKinnon, Neenah, Wis., president of the Stout Student Association, turning the first spade of ground for the new student union at Stout State College, Menomonie, Wis.

Watching (left to right) are Dr. Ralph Iverson, M. M. Price, Keturah Antrim, and President Verne C. Fryklund, all of the college administration, together with Stephen Playter, the architect, and R. L. Pierce of the Board of Regents of Wisconsin State Colleges. The two-story $525,000 structure should be ready next spring.

★ ★ ★

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Association News

COMING CONVENTIONS

June 9–13. Idaho Vocational Association, at Idaho State College, Pocatello, Idaho. Executive secretary, William Swenson, 610 Main St., Boise, Idaho.

June 9–14. Colorado Vocational Association, at Colorado State University, Fort Collins, Colo. Secretary, C. O. Banta, director of vocational education, Trinidad Junior College, Trinidad, Colo.

June 12–13. Georgia Vocational Association, at Biltmore Hotel, Atlanta, Ga. Secretary, R. E. Hagen, 232 Pryor St. N.W., Atlanta, Ga.

Aug. 11–12. American Technical Education Association, at Buffalo, N. Y. (jointly with A.V.A.). Secretary, Richard Howrs, State Office Building, Hartford, Conn.

Aug. 11–14. American Vocational Association, at Hotel Statler, Buffalo, N. Y. Secretary, Lowell A. Burkett, 1010 Vermont Ave. N.W., Washington, D. C.

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IDAHO INDUSTRIAL ARTS ASSOCIATION

The annual meeting of the Idaho Industrial Arts Association was held in Boise, Idaho, on March 28, 1958.

Various problems relative to the group were discussed and a new group of officers was elected for the coming year. The new officers are: president — Irving L. Stiber, Senior High School, Caldwell; vice-president — Martin W. Metz, North Junior High School, Boise; secretary-treasurer — James O. Coleman, East Junior High School, Boise; past president — Thomas W. Matthews, Ricks College, Rexburg.

The meeting was highlighted by a presentation from William Swenson, executive secretary of the Idaho Vocational Association. — *Martin W. Metz.*

THE 30TH ANNUAL M.I.E.S. CONVENTION

On April 17, 18, and 19, 1958, the 30th annual Michigan Industrial Education Society meeting was held at Lansing, Mich. The registration opened at noon on Thursday.

The convention theme was "Better Teaching Begins with You."

At 2:00 p.m., the administrators, directors, and supervisors, and co-ordinators met to discuss safety preparation for industry and the development of safe work habits.

Accident prevention on and off the job was discussed by Leo M. Shaw of the Carton and Container Division of the General Foods Corporation, Battle Creek, Mich.; Carl Behnke, manager of the Hartford Accident and Indemnity Company, Grand Rapids; and Walter N. Chimel of the General Foods Corporation, Battle Creek, Mich.

At 8:00 p.m., on Thursday, "Counseling Into Trades and Industries" was discussed under the chairmanship of Arthur L. McGrath.

The topics presented were "Trends in Vocational Guidance," and "Progress Report on a Research Problem in the Development of a Test Having Predictive Values for Selecting Automobile Mechanics"; also "Counseling from the Superintendent's Viewpoint," and "Counseling in the High School."

The Epsilon Pi Tau Breakfast meeting, a joint function of the Wayne State University Alpha Omicron Chapter, and the Alpha Kappa Chapter of Western Michigan College was held Friday morning at 7:45. It was well attended, and Professor Arthur D. Anderson showed his slides on "Design."

On Friday morning Hugh F. Pierce, lecturer in vocational education, University of Michigan, presided at a meeting on "Modern Design and Fabrication."

Charles Hautau, chief engineer of the Hautau Engineering Company, Detroit, Mich., gave a very interesting talk on the designing of devices for automation machinery. He stated that it costs more to make the automatic controls than to produce the machines that are to be automatic.

At the general session at 2:00 p.m., Friday, under the chairmanship of Bernard Kennedy, Ira C. Madden in his usual entertaining and instructive manner, spoke on the subject "Stimulating Student Interest."

"Effective Use of Audio Visual Aids" was discussed by Carl W. Dalrymple; "State Vocational Office Service" was presented by John J. Harris; and "Shop Organization and Procedures" by Charles C. Hunt.

The "Future Teacher Session" at 3:00 p.m., was very interesting.

The annual banquet was held Friday at 6:30 p.m. J. Herbert Cigard, president of M.I.E.S., was the chairman and Dr. John A. Fuzak, the toastmaster.

(Continued on page 6A)

DELTA POWER TOOLS

"100% of our shop power equipment is DELTA"

"We feel that Delta tools have been made as safe as possible yet are built to withstand many years of rugged service," says Byron D. Frantz, Shop Instructor, Windsor High School, Windsor, Colorado, "that's why 100% of our shop power equipment is DELTA." Safety is of primary importance in the Windsor shop, as in all school shops, and safety features of the tools outweigh all other considerations.

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ASSOCIATION NEWS

(Continued from page 4A)

Andrew C. Luff has been elected as the new president of the M.I.E.S.

Honorable life memberships were granted to Dr. Verne C. Fryklund and to Tom Diamond.

H. H. Morrison, Marshall, Mich., was chosen master teacher for 1958–59.

Dr. Verne C. Fryklund addressed the assemblage on the subject "Only Free People Can Be Educated." He drew a comparison between the American workman and the worker and slave laborer of Russia. Russians cannot earn enough to have a high standard of living and happiness. Our children are educated for work but also for culture and the enjoyment of life and their social environment.

The M.I.E.S. Convention party followed the banquet.

A series of demonstrations in auto mechanics, graphic arts, machine shop, plastics, the use of Fiberglas and electronics were given on Saturday morning.

The convention luncheon and the Ship's Program closed another notable M.I.E.S. annual meeting. Charles Smith, Western Michigan University, gave a humorous touch to the whole affair on this occasion with his address entitled "Some Dull Saws for the Bored."

Donald Jesseman of the Stanley Tool Company handled the Deck Officer's job in a very masterful manner.

WISCONSIN INDUSTRIAL ARTS ANNUAL MEETING

The Wisconsin Industrial Arts Association held its annual meeting in Milwaukee on November 7 and 8, 1957. The main speaker was Dr. Robert A. Tinkham, professor, University of Illinois. His subject was Application of Good Design in Industrial Arts Projects.

The newly elected officers for 1958 are: George Jackson of West Allis, president; Armin Gerhardt, Jr., of Appleton, vice-president; Alvin Wutti of Whitewater, committeeman; and Kenneth L. Schank of Racine, secretary-treasurer. H. B. Olstad of Manitowoc is the past president.

Leo R. Ebben of Kohler was presented a life membership for his long service as State Secretary-Treasurer.

Harlan J. Shufelt, consultant in Industrial Arts, of Racine, was honored for his many contributions to the W.I.A.A. He will retire from his present position this year and will make his home in Tucson, Arizona.

Group meetings included Auto-Mechanics, Electrical, General Shop, General Metals, Graphic Arts, and Woodworking.

The drawing teachers were guests of the Frederick Post Co. and Allis Chalmers Manufacturing Co. at a dinner and evening meeting. The meeting concluded with a trip through the blueprint department of Allis Chalmers Co.

More than 350 shop teachers from all over the state attended the two-day affair.

SOUTHEASTERN WISCONSIN INDUSTRIAL ARTS CONFERENCE

The Southeastern Wisconsin Industrial Arts Conference was held Saturday, May 3, at Custer High School in Milwaukee. Eighty-five industrial arts teachers were present at the 8:30 to 3:00 session. A smörgåsbord lunch was served at noon.

A demonstration and talk on Epoxy Resins were given by Mr. Dave Linton, representative of the U. S. Gypsum Co.

Mr. Van Coddington, president of the Lakeside Bridge and Steel Co., gave a talk on "Industry's Co-operation With Education."

Mr. Gene Eberle, district engineer, American Institute of Steel Construction, gave a talk illustrated by colored slides on "Structural Steel Drafting."

Mr. Norman Eberhardt, chairman, Department of Industrial Arts at Custer High School, talked on "Teaching Aids" and gave demonstrations of various methods used in the school's technical department.

Mr. Roy Radtke, supervisor of I.A. for Milwaukee and Mr. W. C. Bohnsack, assistant supervisor of I.A. for Milwaukee acted as cochairmen of the meeting and Mr. Ray Michalak, principal of Custer High, was the host.

ANNUAL MEETING OF VIRGINIA INDUSTRIAL EDUCATION CLUBS

The Virginia Council of Industrial Education Clubs held their annual meeting on May 3, 1958, at the E. C. Glass High School, Lynchburg, Va.

The morning program included registration, a tour of the Meade Corporation for Teachers, and a tour of Historic Appomattox for wives and children.

At the afternoon session at the E. C. Glass High School, Chester Lane, vice-president, Virginia Council of Industrial Education Clubs, presided.

Mary K. Edwards, Cosmetology Instructress, Osbourn High School, Manassas, gave the invocation.

The welcoming address was given by L. H. McCue, Jr., principal of E. C. Glass High School.

H. I. Willett, superintendent of Richmond Public Schools, spoke on "The School Shop — Its Implications in Social and Character Development." He was introduced by M. Lester Carper, superintendent of Martinsville Public Schools.

Clinics conducted were as follows: Group I — Metal Spinning; Leader — George P. Karle, Karle Spinning Shop, Oil City, Pa.; Group II — Spray Guns; Leader — Duval Easley, Bassett, Va.; Group III — Automatic Transmissions; Leader — O. G. Roper, Manager of Service Department and W. A. Huffman, service instructor representative of Ford Motor Company.

A tea and fashion show were held in the home-economics apartment at 3:00 p.m.

The dinner session at 6:30 p.m., included a welcoming address by Dr. Paul M. Munro, superintendent of Lynchburg Public Schools, and an invocation by John M. Leete, general science instructor, Petersburg High School.

Jim Micklen, president, Virginia Council of Industrial Education Clubs, presided.

Clem D. Johnston, past president of the Chamber of Commerce of the United States and chairman of the Chamber's World Trade Committee, Roanoke, spoke on "Economic Outlook." He was introduced by Marjorie Tussing, banquet chairman.

The meeting closed with a Ship's Program under the chairmanship of Lloyd Wolf.

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Personal News

HONORARY MEMBER

Dr. H. H. London recently became an honorary member of Psi Chapter, Iota Lambda Sigma, Southern Illinois University. Initiating ceremonies were held Saturday afternoon January 18, 1958. Dr. London, professor and head of industrial education at the University of Missouri received his Ph.D. from the Ohio University in 1934. Besides his many professional memberships and official assign-

(Continued on page 8A)

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Typical of reports from shops equipped with Atlas-Clausing saws is this one from Gilbert R. Hutchings, Industrial Arts Department, Western Michigan University. "I have found the Clausing saw to be not only the best circular saw but the most for the money. My students show a strong preference for it – prefer using it to other makes in our shop. It is an unusually fine saw, with many features that I highly recommend for school shop use."

The Atlas-Clausing tilt-arbor saw, for example, gives you performance never before achieved in a 10" saw!

It's ruggedly built with 3 HP construction throughout. Has totally enclosed 1 to 3 HP continuous duty motors . . . cast iron base . . . modified wedge cog belt drive . . . big, self-cleaning worm and rack blade-positioning mechanisms.

It's unmatched for safety. Has exclusive clear-vision guard, double locking fence, big mitre gauge with 8¾" x 2" face. Motor enclosed in base.

It's easy to operate. Weight of motor is balanced by torsion spring mechanism – positioning the blade is almost effortless. Fence glides to the position you want it – lifts off for removal or positioning either side of blade. Handwheels are 8" in diameter – exclusive tilt dial is bigger, too, for easy reading.

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24" JIG SAW

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PERSONAL NEWS

(Continued from page 6A)

ments, he maintains a heavy speaking schedule and is a regular contributor to the literature of practical arts and vocational education.

After the ceremonies and banquet at S. I. U., Dr. London spoke informally to Psi Chapter members and guests on the philosophy of and the trends in present-day education. He emphasized the role of industrial education in the more recent and the future developments.

Other initiates of the Psi Chapter January 18 ceremonies were: James H. Brown, Fredrick W. Culpepper, Robert N. Dake, Raymond A. Drew, William A. Ferketich, Donald J. Frey, Bryce D. March, Harold E. Mills, Eugene T. Propes, and Dr. Wayne S. Ramp.

GLEN E. DORSEY RETIRES

Glen E. Dorsey, Director of Vocational Education, Lincoln Public Schools, Lincoln, Neb., retires July 1, 1958, after 34 years of service in the public schools of Nebraska.

Mr. Dorsey taught industrial arts at Diller and Columbus, Neb., before coming to Lincoln in 1929. From 1929 to 1937 he taught industrial arts in Lincoln High and Havelock High. From 1940 to 1954 Mr. Dorsey held the position of Apprentice Coordinator for the Lincoln Public Schools. During the years he held this position, apprentice training in Lincoln was developed and expanded until it became one of the outstanding programs of this type in the Middle West.

Mr. Dorsey assumed the position of Co-ordinator of Industrial Arts and Industrial Education in 1954, a position he held until 1957. This past school year he has held the position of Director of Vocational Education.

Mr. Dorsey received his B.A. degree from the University of Nebraska and his M.A. degree from the University of Wisconsin.

He has also had training at A.E.F. University, Beaune, France, Los Angeles Polytechnic High School, Los Angeles, Calif., and Colorado State University, Fort Collins, Colo.

DR. GAUSMAN RECEIVES APPOINTMENT

Dr. Chester H. Gausman was recently appointed to the position of director of vocational education and industrial arts of the Lincoln Public Schools, Lincoln, Neb. He will assume his new post July 1, 1958, upon the retirement of Glen E. Dorsey, the present director.

Dr. Gausman's present position is that of co-ordinator of industrial arts and industrial education. Prior to this position, he has held positions as electronics instructor at Lincoln High School, Lincoln, Neb.; superintendent of schools at Garland, Neb.; and principal of schools at Harrisburg, Neb., and at Torrington, Wyo.

He was the recipient of a Ford Foundation Fellowship for the school year 1954–55, during which time he surveyed industrial arts and vocational education programs throughout the middle west and far west.

He received his Ed.D. degree in June, 1955, from the University of Wyoming. He is listed in Who's Who in American Education for 1955–56, and is a member of Phi Delta Kappa and Kappa Delta Pi, as well as numerous other professional organizations.

PHILIP H. HANEY

Dr. Philip H. Haney who has recently been elected president of the New Jersey Vocational and Arts Association, is the assistant director of the Essex County Vocational and Technical High Schools since July 1, 1953.

Dr. Haney served as supervisor of instruction and teacher trainer from 1950 to 1953. Previous to that he was supervisor of apprenticeship, part-time, and evening instruction. Before assuming the latter post in 1945, he held the position of assistant supervisor of War Production Training from 1943 to 1945 and supervisor of N.Y.A. Related Instruction from 1941 to 1943. He taught related technical subjects in the Essex County Vocational and Technical High School from 1939 to 1941.

Born in Carbondale, Pa., Dr. Haney was educated at Stroudsburg (Pa.) High School. He completed a drafting apprenticeship in the Schenectady, N. Y., plant of the General Electric Company in 1932 and received his bachelor of science degree in mechanical engineering at the Georgia School of Technology in 1937. His masters degree in education was granted by New York University in 1942 and the degree of doctor of education was conferred by Rutgers University in 1949.

Before coming to the Essex County Vocational and Technical High Schools as an instructor, Dr. Haney served as an engineer in various departments of the General Electric Company where he completed both the Engineering Test and the Business Administration Course for Engineers.

♦ Edward Schwartzkopf has been appointed co-ordinator of industrial arts and industrial education for the Lincoln, Neb., public schools. He formerly taught industrial crafts and drafting at Lincoln High School.

Mr. Schwartzkopf received his bachelor of science and master of arts degree from the University of Nebraska.

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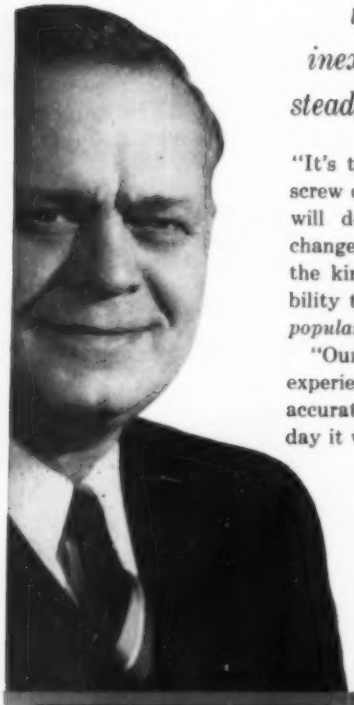

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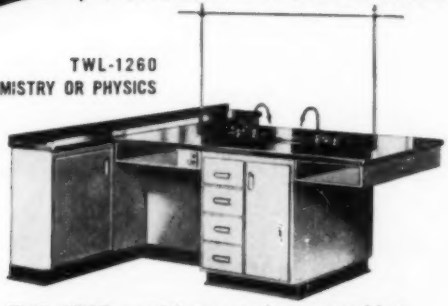

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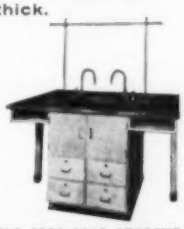

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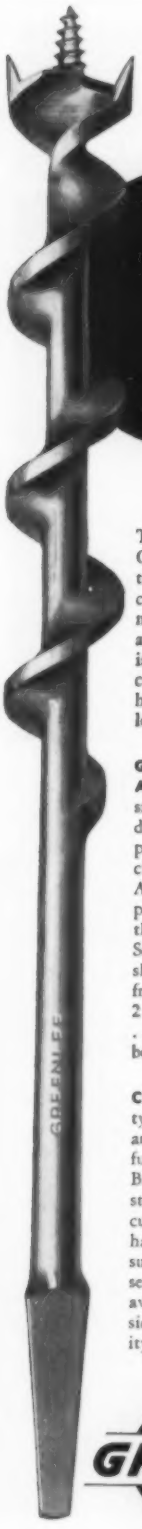

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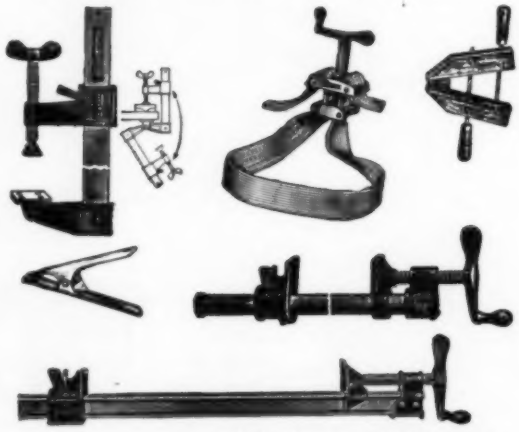

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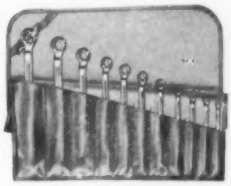

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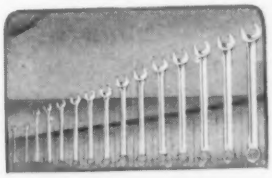

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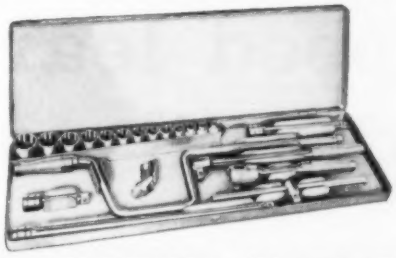

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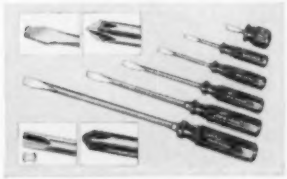

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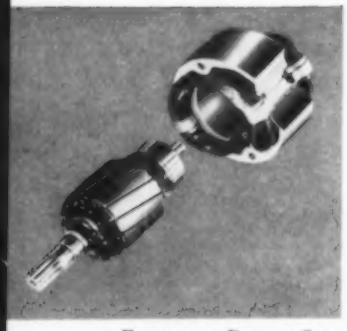

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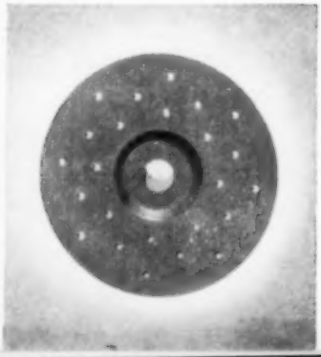

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
JUNE 1958

Related Materials on Iron and Steel

FRANCIS J. KAFKA
New York City Public Schools
New York, N. Y.

No program of industrial arts in the secondary schools has a right to the claim that its educational value in general education parallels that of other subjects if it is concerned only with tool and manipulative skills. Many of the industrial-arts subjects require a considerable amount of study of theory, mathematics, and science, all of which are properly considered as related lessons. However, such areas as general metalwork and metalwork in the general shop are too frequently considered primarily as tool skill areas. To deliberately overlook the community and some of the country's largest industries as sources for related lesson material is to overlook the rich opportunities for strengthening educational efficiency. Gordon Wilber defines such a resource as " . . . either human or material, that can be used to further the objectives of industrial arts. . . ." In summarizing the importance of these source materials he emphasizes that the student is made aware of the resources and that they provide the teacher with materials not otherwise available. An iron mine or a steel mill cannot be brought into the school shop except in the form of a moving picture! However, countless communities contain iron ore deposits since they are so widespread (even though not worked commercially) and most communities will contain a plant making use of iron and steel industrially.

Allowing for the administrative routines of a school shop, including record keeping, housekeeping, and safety, it is generally agreed that approximately 20 per cent of the remaining time during the course of a school year be devoted to related lessons. Emanuel Ericson groups related information into these kinds: (1) That which directly bears on the efficiency in performing work. (2) That which will tend to increase the general scope of vision of the learner. (3) That which leads to occupational information. It is believed by the authors that a study of iron and steel including the use of moving pictures and field trips will fulfill these desired educational outcomes. This article is written so that the teacher can use part or parts of it in developing related lessons in most of the industrial-arts subjects. It will prove of greatest value of course, in the general metal-working subjects. It does not propose to be a complete reference work for the teacher but rather a source reference from which the teacher can choose topics for development into learning situations and variety in teaching methods. The article is divided roughly into the categories of the history and importance of iron and steel, general uses of this material, both industrially and in the school shop, the mining of iron, making of steel, and finally how to conduct field trips in search of iron ore.

Historically, it is difficult to date man's first use of iron because of its corrosive nature, but it has been used for thousands of years. An iron blade estimated to be 5000 years old has been found in an Egyptian pyramid and it has always been believed that the ancient Egyptians must have developed the use of steel to have built the great pyramids and carved the hard stone on which are found their designs and hieroglyphics. Homer mentions the use of steel in Greece. Iron was worked in China thousands of years before the Christian era, it was known in Chaldaea and Assyria, and references in the Old Testament indicate that the Hebrews were familiar with it. The ancient Greeks have been given credit for casting iron statues and hundreds of currency bars of iron have been discovered in England to prove that the Roman occupiers used it. Modern man can only surmise how the Ancients discovered its properties but it does not sound unreasonable to attribute the discovery to accident. It is known that ancient man used metallic ore bearing rock for what have been called, "paint stones." He derived decorative pigments from the metallic oxides. It is possible that with the use of fire for warmth and cooking that one such fire built against a rich deposit yielded molten iron. It followed then that man would associate his fire with the paint stone and build fires deliberately to extract the iron. The bellows, used for fanning to greater

temperatures is known to be a very early mechanical device. In the making of wrought iron by the Catalan forge method (used up to the fourteenth-century with minor changes) the iron pigs were packed in charcoal and *roasted* for days to burn out impurities. Steel was thus accidentally produced at times, when the iron absorbed a certain amount of the carbon.

The economic importance of iron in the United States is best realized in terms of production figures. Of the 410 million tons of usable iron ore produced by countries producing more than 100,000 tons a year, the United States in 1955 produced over 115 million of these tons. In addition to this some 26 million tons were imported and a total of 5 million tons were exported. The production of pig iron in the United States was 33 per cent greater in 1955 than in 1954, resulting in a production of over 79 million tons of the total world production of some 211 million tons. More than 75 per cent of the pig iron produced in this country is used in steelmaking. Since the decade ending in 1890 the United States has led in the world production of both pig iron and the production of steel ingots and castings.

It is important from an educational point of view when viewing the student as a potential consumer, to give iron and steel their important places as reasonably cheap commodities in the United States. From the production of hundreds of millions of tinned cans for food preservation, and which are merely disposable containers, to the vast production of automobiles (over 9 million of the world's 13 million produced in 1955) no phase of life is not influenced by iron and steel in our modern economy. By the turn of this century steel was well on the road toward replacing wood in so many of the conventional uses. Furniture, cabinets, building materials, as well as transportational vehicles were produced of steel. Even the increased production of plastic synthetics and improvement in production and fabrication of nonferrous metals, does not appear from the present trend, to have much influence on steel production. The U. S. Bureau of Mines has been conducting intensive research in the field of utilization of low-grade iron ores and announced in 1956 that it would speed up research including that into low-grade red ores and iron-bearing sandstones of Southeastern United States. In October of last year a $190 million processing plant was dedicated at Silver Bay, Minn., for processing taconite (a difficult and complex ore to process).

The development of ferroalloys such as stainless steel, chrome steel, tungsten steel, vanadium steel, and titanium steel, has given the industry materials with which to compete against the advantages of many of the nonferrous metals. As a future consumer the student should be aware of, and reasonably familiar with the development of various ferroalloys because some of these alloys have radically changed man's basic concept of the properties of iron and steel. The study of alloys is a highly complex and technical study, far beyond the reach of the average secondary school student. However, it involves readily related studies in chemistry and geology as well as in metallurgy and opens up vistas showing modern man's careful scientific approach in becoming the absolute master of the material, as opposed to the elemental extraction of iron and the crude working of it into wrought iron.

Iron is formed into an alloy to make it stronger, lighter in body, more easily machined, or resistant to corrosion. In addition to this the fine grain structure of American steels in general, have given a tremendous lead to the industry, because a material is produced which can withstand the tremendous forces used in mass-production fabrication. The teacher is wise to emphasize not *only* the advantages of abundance in natural resources, but the carefully calculated methods used in steelmaking, planned use of the known properties of the material, and scientific production control.

Stainless steel, which is also referred to as chrome-steel, is an alloy of iron and more than 10 per cent of chromium. When this quantity of chromium is added to iron it imparts throughout the *entire* body of the metal extreme resistance to corrosion and extreme resistance to heat. This discovery was an important forward step since neither of these properties was inherent in iron or ordinary steel. *Tungsten* steel is associated in importance with materials that have great enough hardness to cut other hard materials. The tungsten atom is so much larger and heavier than iron that it diffuses so much more slowly in solid metal. Therefore a very high temperature is required for solution before quenching. This is a very important property of the alloy because in tempering, carbide particles form very slowly. This imparts to tungsten steel its ability to hold its hardness at very high temperatures and has given it hardness and cutting qualities approaching those of the diamond.

Titanium steel is distinguished by its extreme strength. When great tensile strength is imparted to steel, bulk and mass may be sacrificed. This results in thin members, light in bulk, having great strength. Step ladders and similar items are now in production made of titanium steel alloys. *Vanadium* steel is an alloy of carbon steel with the addition of vanadium. This combination imparts to the resulting alloy great tensile strength in addition to toughness and elastic limit. Because of the greater elastic limit of this alloy, vanadium steels are used greatly for the fabrication of axles, drive shafts, gears, and locomotive frames, or wherever elasticity and resistance to fatigue are required.

The following kinds of steel are commonly used in the school shop: galvanized iron, tin plate (or terneplate), soft steel (wrought iron), mild steel.

It is of great value, educationally, to determine that the materials which *are* at hand are quite thoroughly understood. Pedagogically, it is simple to be carried away in the manner associated with highly specialized materials while overlooking certain of the ordinary, close-at-hand varieties. The latter offer no less an opportunity for related learning. The limitations of cost, tools, and machining equipment, and the limited experience of secondary school students makes it virtually impossible to explore and experiment with *all* varieties of iron and steel. Familiarity with them, however, and an awareness of their place in the technology can still be inculcated.

Galvanized iron is a low-carbon steel which has been dipped in molten zinc after annealing, pickling, and cold rolling. It is a cheap quality material designed to meet the qualifications of noncorrosion and low cost. It is weak under distortion. It can be used effectively in the school shop when the finished article is to be painted, or used in such a manner that it will not be distorted in use. *Tinplate* is a soft steel coated with pure tin. It is used commercially for food containers because it is nonpoisonous and resistant to the action of vegetable acids. It is rustproof and resistant to corrosion. It also solders easily, having an affinity for lead. It is bright and silvery in appearance and will withstand distortion better than the galvanized material. *Terneplate* is similar to tinplate but is coated with an alloy of lead and tin and is, therefore, not used as a food container. The steel is usually Bessemer or open-hearth steel. *Soft steel* and *mild steel* have reference to the carbon content. The lower the carbon content the softer and more malleable the substance. Those containing less than 0.15 per cent of carbon are, strictly speaking, classified as irons. Wrought iron falls into this category. However, wrought iron as such has been worked and forged after smelting and is *not* the substance used today and referred to frequently *as* wrought iron. Soft steel is a low carbon content steel. Mild steel has a slightly higher content

of carbon. The higher carbon content steels are used for tools and high-strength parts of machinery.

With the fundamentals of a study of iron and steel in hand the teacher can now turn to a study of mining, the vast area of steelmaking, and the related studies of the earth sciences as accomplished through actual field trips.

There are many different types of iron ore, each of which may contain several different ore minerals. The principal ore minerals are hematite, magnetite, limonite, and siderite. They vary in the percentage of contained iron, some being of higher quality than others. The actual determinant of the quality of an iron ore is the amount of ore mineral in the ore which, as it is mined, contains waste rock, clay, and other worthless substances, the percentage of iron in the ore mineral, and the quantities present of either harmful or valuable included substances. The presence of such elements as sulphur and phosphorous in an iron ore reduce its quality since they tend to make steel brittle. Other substances such as manganese, chromium, and nickel are valuable extras since their presence will make the production of alloy steel more economical.

At the present time the United States steel industry is using iron ores ranging from 50 to 65 per cent of iron. Because our country has been richly endowed with vast deposits of high grade ore, we have relied almost exclusively upon them. All our blast furnaces and other smelting equipment have been designed for their utilization. Now, with the rapid depletion of our domestic high grade ore reserves, we are turning both to foreign ore sources and to our own low grade deposits. Europe, which has been long using lower grade ores, is not faced with the changes our own iron and steel industry is now undergoing.

The process of enriching or beneficiating low grade taconite iron ores is a difficult and expensive operation.

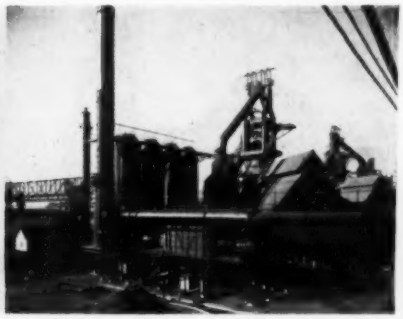

Fig. 3. A mechanical loader in a coal mine. (At right) Fig. 4. A blast furnace having a 28-ft. hearth diameter. Iron ore is smelted to pig iron in a blast furnace

Ores ranging as low as 30 per cent iron ore are being mined by special open pit methods, crushed and ground to fine powder, the iron separated from the waste magnetically, and the resulting enriched iron ore rolled and baked into tiny spherical pellets. Thus the industry's blast furnaces need not be adjusted to the use of low grade ore for the ore is upgraded to meet the furnace requirements.

Taconite is a low grade ore because of the large amount of waste mixed in with the ore mineral. Other types of deposits may be low grade because the ore mineral itself does not contain a large amount of iron. The richest ore mineral is magnetite (Fe_3O_4) which contains 72.4 per cent iron. It is a heavy, black, dense mineral which will attract a magnet, hence its name. Some magnetite will act as a magnet itself and, when it does, is called lodestone. Because of its hardness and its usual association with hard crystalline rocks, magnetite is difficult and expensive to mine. It is usually mined by underground methods but in some cases in open pits. The great richness of magnetite as an iron ore usually offsets the higher costs of mining. The famous high grade Swedish iron ores are composed of magnetite. About 5 per cent of our pig iron production is smelted from this mineral.

The most common ore mineral used in the United States is hematite. About 94 per cent of all American iron smelted comes from this mineral. Hematite (Fe_2O_3) is a rusty red material softer than magnetite, which contains 70 per cent iron. It has the same chemical composition as ordinary iron rust. It occurs in vast quantities in this country. The Lake Superior iron mining region, the greatest in the world, mines hematite by open pit methods of gigantic proportions. The iron locked in taconite in this region is also hematitic. The extensive Clinton iron deposits of the Appalacian region, which will be described later, are composed primarily of hematite. Almost all of the foreign ore now being imported is also hematite making this mineral the mainstay of our iron and steel industry.

The two lesser iron ore minerals are limonite and siderite. Limonite ($Fe_2O_3 \cdot H_2O$) is actually not one mineral but a name for a series of hydrated iron oxides. This material is usually nondescript, ugly in appearance, with a brown to yellow color. It contains from 59 to 63 per cent iron and is extremely soft. It is usually found on the surfaces of other iron ores deposits as a result of weathering and hydration of those iron minerals. It is mined solely by open pit methods. About 1 per cent of our iron production comes from limonite.

Siderite ($FeCo_3$) is hardly used in this country but is important in Europe. Although it contains 48.2 per cent iron, it has the disadvantages of requiring preliminary roasting to drive off the CO_2 which it contains before being placed in the blast furnace. Siderite is a fairly hard, usually crystalline, yellow to brown mineral. It displays the same type of rhombic cleavage as does calcite. Hardly any siderite is mined in the United States although it was formerly an important ore mineral.

While there are several different iron

Fig. 1. An open pit mine in Cornwall, Pa. This mine was in operation prior to the American Revolution. In 1954 deep mining was undertaken. (At right) Fig. 2. A limestone quarry used to supply limestone required in blast furnaces

ore minerals, there are also a number of different types of iron ore deposits, each having widely differing origins. Generally speaking, there are three types of ore deposits. The first of these are those deposits associated with igneous or once molten rocks. The mineral, which is usually magnetite, may have segregated out from the molten materials or have been injected into the invaded rock or, more commonly, into cooled portions of the invading rock. Magnetite is often found where igneous rock has intruded limestone or limy shales. The heat of the molten rock plus iron containing liquids and vapors change the invaded rock into magnetite and other minerals by a process known as contact-metasomatism. The iron deposits of Cornwall, Pa. are examples of this latter type while the magnetites of Sweden and of the Adirondack region of New York are probably examples of segregation or injections. Other magnetite ore bodies are found in New Jersey, North Carolina, Missouri, and Wyoming.

Iron ore deposits of a second type are those of sedimentary origin. At the present time they are of primary economic importance. Beds of sedimentary iron, usually in the form of hematite, limonite, or siderite, were laid down as tabular bodies in restricted seaways or swamps. The iron was once in these sea or swamp waters in the form of colloidal iron or as iron bicarbonate due to the weathering of iron rich rock. This iron was precipitated by the presence of an oppositely charged electrolyte, by the loss of carbon dioxide from the water, or by the action of bacteria. Thus where special conditions existed which would permit this process to operate, vast beds of iron ore were deposited. The iron ore deposits of the Lake Superior region are probably of this origin. They have been later enriched and then altered by heat and pressure. The vast Clinton iron ore deposit which extends throughout the Appalachian region from New York to Alabama is one of the best examples of a sedimentary iron ore. It occurs in interstratified with normal sedimentary rocks and contains fragments of fossils coated with or even replaced by hematite. The bed has a linear extent of 700 miles and is especially thick in Alabama where it is the mainstay of the great Birmingham iron and steel industry. Other sedimentary iron ores are found in Pennsylvania, Ohio, Wyoming, and in Labrador, Newfoundland, Brazil, Venezuela, England, France, Germany, and Russia. The Canadian and South American sedimentary deposits are the chief sources of our imported iron ore.

A third general type of iron deposits are those composed of residual ore minerals. In certain limestone regions such as in the Appalachians, the softer sedimentary rocks have been dissolved or eroded away leaving a residue of limonite which collects in caverns, sink holes, and solution channels. These deposits may be very rich but are small and therefore of little economic importance. Another type of residual iron deposits are those resulting from the subtropical weathering of iron rich rocks such as gabbros or serpentines. Such soils produced by weathering and leaching are called laterites and, if the rocks are iron rich, the mineral formed is limonite. If the rocks are rich in aluminum, the result is bauxite. Important laterite or residual iron deposits are mined in Cuba and Liberia.

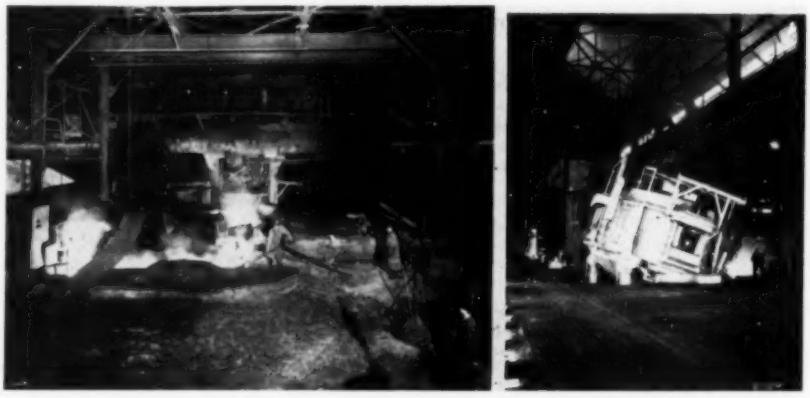

Fig. 5. The casting floor of a blast furnace. Molten iron is coursing from the tap hole through runners in the floor to waiting ladle cars below. (At right) Fig. 6. An electric furnace in tilted position, discharging into the transfer ladle

The other raw materials basic to the production of iron and steel are limestone, coal, steel scrap, air, and water. Limestone is a very common sedimentary rock composed of calcium carbonate which is used as a flux. It is usually quarried near the great steel centers. However, a noteworthy limestone producing region relatively far from any industrial area is located in northeast Wisconsin and the northern Michigan peninsula. This area owes its importance to the use of Great Lakes water transportation. Bituminous coal is used for the production of coke which is essential in the smelting process. Since it is easier to transport iron ore than coal, our great steel centers are located near the bituminous coal fields. Most of the coal used by the steel industry is produced from captive mines, that is, mines owned by and which produce solely for the steel companies. Because coal is used to make coke, only a certain type and grade of coal can be used.

Scrap iron is an essential ingredient in the final steel making operation since it is used in the Open Hearth and Electric Furnaces as well as in the Bessemer Converter for combustion. Huge amounts of water are necessary for general cooling purposes. In order to produce one ingot ton of steel the following amounts of raw material are needed: $1\frac{1}{5}$ ton of iron ore, $\frac{3}{4}$ ton of coal, $\frac{1}{3}$ ton of limestone, $\frac{2}{5}$ ton of scrap steel, 5 tons of air, and 80 tons of water.

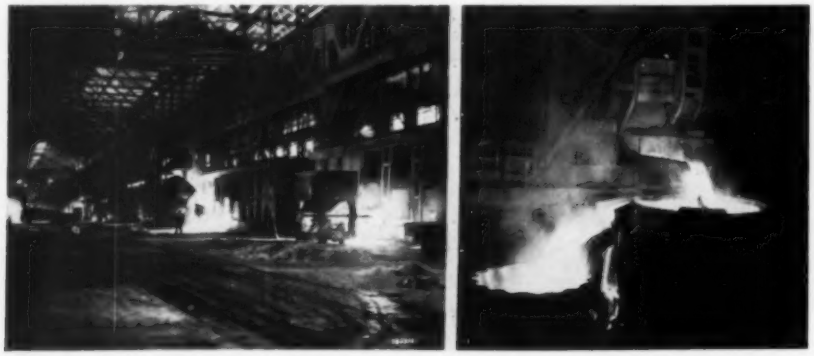

Fig. 7. A view of an open hearth furnace department. (At right) Fig. 8. Tapping of an old hearth furnace showing the steel flowing into the larger ladle and the slag floating over into the "thimble" next to it

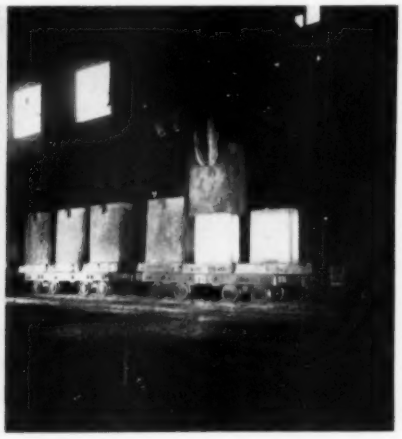

Fig. 9. Pouring open hearth steel into ingot mold. (At right) Fig. 10. Stripping the mold from the congealed ingot

The actual process of producing steel is a fairly complex operation. The details of this process can be easily obtained from the many fine charts and pamphlets made available by the Iron and Steel Institute and by the steel companies themselves. Therefore this account will be simply a general over-all view of the steel making operation.

Iron ore, limestone, and coal are gathered from their respective sources. The coal is crushed and blended before it is converted to coke in gigantic by-product coke ovens. The destructive distillation process which removes the volatile matter from the coal takes 18 hours. The gas produced is used for fuel in the coke ovens, in the open hearth furnaces, and the various soaking pits and furnaces. Other by-products recovered are coal tar, benzol, ammonia used to make ammonium sulfate, and various other coal chemicals. The coke produced is composed of strong, porous, almost pure carbon.

The various raw materials of the smelting process, ore, limestone, and coke, are carefully measured and dumped into the top of the blast furnace by means of a skip hoist. A double bell arrangement prevents the escape of hot gases and fumes from the top of the blast furnace during the loading operation. Air, which has been preheated in stoves by the exhaust gases, is blown into the furnace near its base. The coke burns at a tremendous heat producing carbon monoxide. This combines with the oxygen in the iron ore forming carbon dioxide and molten iron. Some of the iron melts out directly from the ore due to the great heat. The silica and other impurities in the ore combine with the limestone flux to form slag which floats on the surface of the molten iron collecting in the bottom of the furnace. The molten iron is drawn off every six hours into ladles or hot metal cars. The slag is drawn off separately into ladles for disposal.

In an integrated iron and steel operation the iron is taken directly in a molten condition to the steel making furnaces. In some cases the iron is drawn off into sand molds called pigs and is allowed to solidify, hence the name *pig iron*. There are three types of steel making furnaces, the open hearth, the Bessemer converter, and the electric arc furnace. In each of these furnaces impurities that still remain in the molten iron are also burned out. Alloying materials are also added at this stage.

The open hearth furnace is a huge basin filled with molten steel over which coal gas flames are directed. It is charged with molten iron, steel scrap, limestone, and some iron ore. A huge ladle pours molten iron into the furnace while a charging machine dumps in the other materials through the furnace doors. After 8 to 12 hours of heating, all the impurities have either been burned out or absorbed by the slag. The furnace is then tapped and the steel pours out into a ladle, while the slag, leaving the furnace last, flows into another ladle. About 90 per cent of this country's steel is produced by open hearth furnaces.

In the Bessemer process molten iron plus steel scrap is placed in a tilting Bessemer converter. Hot air is blown through holes in the bottom of the converter burning out the impurities. After ten to fifteen minutes of this blowing during which flames and sparks leap from the mouth of the converter, the air is shut off, the converter tipped over, and the molten steel poured out into a ladle.

The electric furnace is also a tilting furnace but the heat is supplied by an electric arc rather than by a burning process. The furnace is charged with

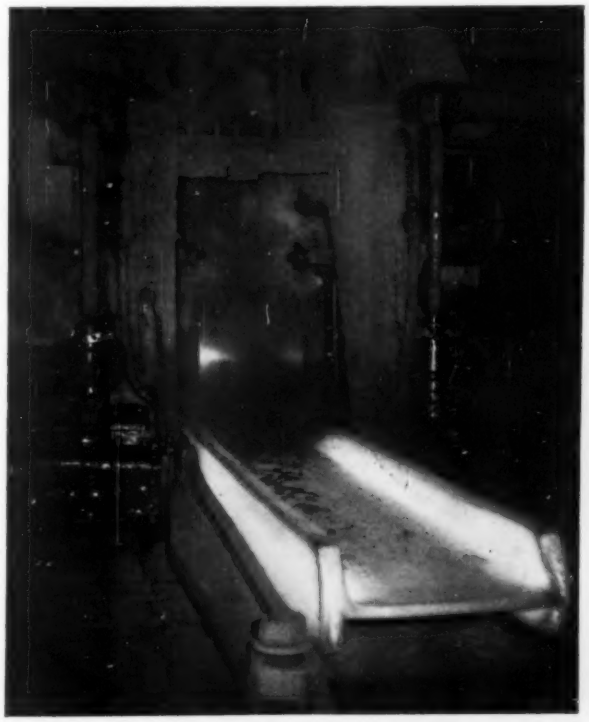

Fig. 11. Rolling a structural section on the universal mill

molten iron and steel scrap. The arc forms between three carbon electrodes penetrating through the roof of the furnace and the scrap resting in the bottom. The heat burns out the impurities. The slag is poured off and alloying materials are added to the steel after it has been poured off into a ladle. The Electric Arc Furnace method is used for making small quantities of high grade alloy, tool, and special steels.

As the steel leaves each furnace, it is poured into a ladle. These ladles are used for filling or "teeming" ingot molds. This is accomplished through a valved opening in the bottom of the ladle. When the steel in the ingot molds has cooled sufficiently, the ingot molds are stripped off by a stripping crane. During the teeming process the ingot molds rest on narrow gauge railroad cars. When stripped, the cooling ingots remain in these cars and are transported on them to the soaking pits. Steel to be used in castings is conveyed directly to the foundries while steel for forgings is poured into special ingot molds.

Prior to sending the standard ingots through the rolling mills, the stripped ingots must be reheated to a uniform temperature. This is done in gas fired soaking pits where the ingot temperature is raised to 2400 deg. F. This is 100 degrees less than the temperature of the iron as it left the blast furnace but 500 degrees less than the temperature of the steel as it was poured into the ingot molds.

The three basic types of semifinishing rolling mills are the blooming mill, the Universal slabbing mill, and the billet mill. From the blooming mill come blooms to be used in producing structural steel and rails. The slabs which are rolled in the slabbing mill are used to produce plate, sheet, and strip. The billet mill turns out billets to be used for rod, bar, seamless pipe and tube production. There are various degrees of integration between the operations of the semifinishing and the finishing mills depending on the needs and practices of the individual steel companies.

One of the best ways for young students to get a grasp of the fundamentals involved in the making of iron and steel is through participation in actual field trips. There are two types of trips possible, those to operating mines or to uneconomic ore localities, and those to local foundries, steel fabricating shops, or if fortunate, to a steel mill itself.

Some areas are great iron ore producing regions. Others because of different geological conditions, are virtually devoid of iron. The location of producing mines is easy to determine because of their conspicuous nature or through newspaper and magazine reports. Unworked localities are more difficult to find but a study of state or federal reports on local geology should reveal their location if any such deposits are present. A field trip to even an abandoned deposit should prove of great interest and value. Not only will the student see at firsthand the nature of the ore and its geologic relationships but he will be able to collect representative specimens for himself. The point which must be stressed, however, in visiting any ore locality is that the deposit viewed is only one of many possible types.

Information about local foundries and mills is best obtained through local chambers of commerce. They will usually supply the names and addresses of various firms which would be glad to show an educational group through their operations. A request for a visit submitted on school stationery will usually bring prompt results. The ensuing trip will be of incomparable value for it will serve to introduce the student to the basic processes which make industrial development, and as a result, life as we know it today, possible.

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Live Automobiles or Automobile Units in the High School Auto Shop

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In scanning the former editions of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine I found the controversy of "live automobiles" or "automobile units" has been with us since the conception of the high school auto shop.

Educational progress has been made, but the above issue remains with us today; there appears to be no clear-cut answer. As one of my professors stated it, "I have seen both systems work, it depends in which type the instructor believes."

Perhaps, we need to go back, beyond the immediate issue, to the concepts which direct education, the science of educational psychology. Theories in educational psychology have by no means reached a point of complete agreement; however, the differences appear to be in terminology and method of explanation, they differ very little in their total conception of learning.

Most of today's educational psychologists point out that the job of an effective teacher is to guide the all-round personality development of his students. Personality can be defined as the total pattern of ways of dealing with challenges and problems of life. Thus, an effective teacher wants his students:

a) To be able to deal with the challenges and problems of life by the higher mental processes.

b) To have a varied range of living interests and vital concerns.

c) To have a common body of experiences, understanding, knowledge, beliefs, and aspirations.

d) To have a wholesome personality.

Before a teacher can realize these objectives he must:

a) Observe the student.

b) Discern his developmental status.

c) Match this status with the appropriate tasks.

d) Evaluate what learning has taken place.

Educational psychology has developed a concept of basic needs that are constant and universal. This concept cannot be proved, but it is the best way of explaining human behavior. The basic needs, as listed below, have been taken from James L. Mursell's *Psychology for Modern Education*.

1. Physiological — air, food, shelter, rest and activity, sexual.

2. Status (social needs) — need for affection, need to feel as belonging, need to resemble others in general behavior.

3. Ego need — contact with reality — not living in a dream world, harmony with reality. Understanding the world about us as it really is in contrast to being dominated by superstition, rationalization, and fantasy. Progressive symbolization — pattern of beliefs by which we live.

As motives come from basic needs, we should find what the student's motives are and build on them. If we build our subject matter on student motives, he will understand, learning will become meaningful; he will experience success. Positive motivation will develop a momentum of its own. Learning to the student will become an exciting thing. It will affect his way of acting, thinking and feeling.

It can be said that no real learning takes place unless motivation exists. Motivation involves the will to want to do something. To have effective student motivation, we need well-defined student goals. Many students do not possess this asset of learning. Our job, as teachers, is to assist in defining and developing these goals; as a lack of well-defined goals is a major factor in the lackadaisical, don't-care attitude of many of our auto shop students.

In the auto shop we must help the learner to see subject matter as a solution to real life problems which he cannot solve with existing behavior patterns. The learner must discover new methods or techniques of solving problems involving insight. Insight may be defined as understanding, thinking, and seeing organized relationships of the problems. Subject matter then becomes a means to learn when its concepts (which are lasting, guide lines for thought and action, and tools for living) fit into a known pattern.

The person for whom the course is designed — the student — is going through a period of rapid change, both physically and emotionally. In short he is a bundle of restless energy, still immature, yet striving for independence and adult recognition. Perhaps the softest spot in his armor, is his ego; he wants contact with reality, not to live in a dream world. He wants to understand the world about him as it really is — harmony with reality. He needs vocational guidance or we could say help in defining his vocational goals.

Live automobiles or *automotive units* — which of the two systems offers the best solution in meeting the students' needs. Let's review the advantages and disadvantages of each.

Live Automobiles — Advantages

1. Motivating factor. This method of teaching appeals to the students more and in order to get the best results, the student must be interested. Nearly every boy prefers to work on real cars and engines that actually run.

2. Life experience work situations. It is a well-established principle of teaching that people learn best by practicing under real, practical working conditions.

3. Many different types of jobs are available to fit the maturation level of the students.

4. Student feels he is actually doing something worthwhile.

5. Student is challenged, faced with practical problems which he cannot solve with existing behavior patterns.

6. Student has a chance to experience success in relationship to his aptitude.

Live Automobiles — Disadvantages

1. Difficult to correlate classroom subject matter and shop activity. The securing of the right kind of job at the right time.

2. In large classes it is difficult for the instructor to check every operation and this inspection is very essential on real jobs.

3. Student becomes so engrossed in reaching his goal, as, for instance, completing the work on his car, that he poses a problem for classroom control and routine.

4. This plan is not suitable for young pupils, rather it is more adaptable for eleventh and twelfth grades.

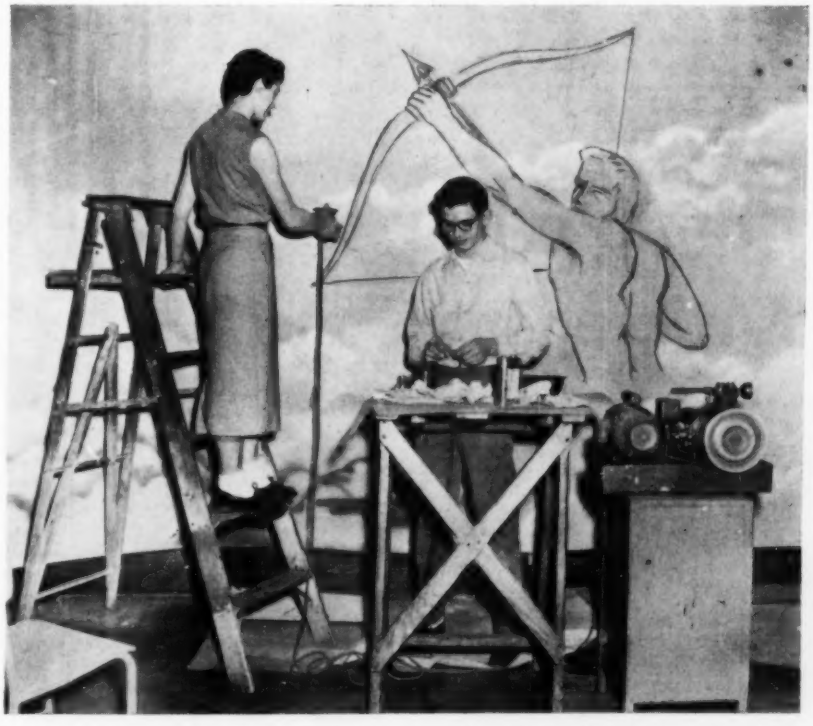
5. There is a danger of the pupil damaging his car while learning.

6. This plan places a great deal of responsibility on the instructor.

Unit Plan — Advantages

1. Good correlation of classroom subject matter and lab activity. Instructor may follow his course outline closely, never has to wait for jobs.

2. It removes the responsibilities that are connected with road jobs, for the



Commercial art student mural was made at Mastbaum Vocational-Technical School, Philadelphia. Submitted by Benjamin J. Novak, vice-principal of Frankford High School, Philadelphia, Pa.

repair parts are never used on a car again.

3. It is easier to teach, because, the classroom situation is more closely controlled by the instructor.

4. It is easier to supervise and facilitates the keeping of the shop in a presentable condition.

Unit Plan — Disadvantages

1. Development of poor work habits. The pupils have a tendency to become careless and to feel that the job is not of real importance since the automobile parts repaired or replaced will never be used again.

2. Lack of motivation. Pupils have a tendency not to want to complete an operation, such as the replacing of lock washers and cotter pins.

3. Expense and difficulty of securing up-to-date parts, for car designs change so rapidly that not many school boards will supply good or new parts to meet this need.

4. Poor transfer of learning as student becomes obsessed with just finishing the task and as a result no real learning takes place.

Unfortunately, the student is not the only factor involved in the type of shop to be set up. Seeking a job last September it became apparent that the philosophy of the administration is a determining factor.

Facilities available — equipment, tools, shop space — also help to define the type of program to be offered. Trying to offer a live program in a small shop without adequate tools and equipment is sure to present almost insurmountable difficulties, while a unit type shop can be set up in a much smaller area with fewer tools.

The amount of time available, whether the shop is for one or two work periods is also important. During my student teaching, working with students who had a 15- to 25-minute interest span for classroom work, I found it difficult and disheartening to present an organized sequence of learning involving classroom material in a live shop situation, consisting of a 55-minute period. Sufficient time was not present to accomplish anything; students were continually frustrated by the lack of time to complete a task given.

The instructor's experience is also important, as the teacher training college cannot provide the practical background to meet the different types of situations arising in a live shop. There is nothing that loses or gains the respect of your students faster, than the degree of your ability to make practical application of the subject you are teaching.

The instructor of an auto shop without vocational experience could begin with the controlled type situation, unit plan, and gradually work into a live shop program, as his teaching experience would prove comparable to vocational experience.

Thus, we see in facing reality that a combination of both plans is feasible in the majority of teaching situations to eliminate many of the disadvantages of both, the degree to be determined by the prevailing circumstances.

In selecting the type of shop we will use, we must remember that the important person is the learner, and that the subject matter must be (1) meaningful, (2) challenging, and (3) that the student must experience success.

As a closing thought, let's consider a lesson taught by a humble carpenter. "The Parable of the Grain of Mustard Seed."

> The kingdom of heaven is like a grain of mustard seed which a man took and sowed in his field; it is the smallest of all seeds, but when it has grown it is the greatest of shrubs and becomes a tree, so that the birds of the air come and make nests in its branches.

As auto shop teachers, our fields are the shop and classroom, our seeds are tools for dealing with the challenges and problems of life. Are we planting any seeds: if so, will they grow?

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Portable Power Tools— Maintenance and Care

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Powered hand tools must be properly used and cared for in order to give best results and long service. Regular inspection and service should be strictly adhered to.

If the following tips on maintenance and operation are followed, the tools will give longer and more efficient service, better performance, and greater production.

Care of Motors

Avoid Motor Overload — Causes of overload are: starting or stopping the tool while it is in the work; crowding or jamming tools; dull bits or blades; severe voltage drop under load due to undersize cord.

Most portable electric tools are equipped with "universal" type motors. These motors will operate either on d.c. or on a.c. current of 25, 30, 40, or 60 cycles, of the specified voltage for which they are designed, as indicated on the name plate. They will operate satisfactorily at 10 per cent over or under the specified voltage, but serious damage to the motor will result if the voltage varies more than the 10 per

cent. Check voltage specifications with the voltage of the supply line. Do not plug in if they do not correspond.

Keep Motors Clean — Motors should be blown out frequently with compressed air to remove dust from parts and to open clogged air vents. Dismantle tools occasionally and clean thoroughly by washing with naphtha and brushing and drying all parts.

Check Brushes — Be sure brushes slide easily in holders, seat properly on the commutator and that spring tension keeps them seated. Replace brushes before they wear down to irregular stubs.

Do not use substitute brushes except in extreme emergencies and then only briefly until the correct size and type of brushes can be obtained.

Lubricate Regularly — Lubricate tools regularly using only lubricants recommended by the manufacturer and according to his instructions. Clean the gear cases periodically with naphtha and refill with the proper lubricant. On those tools having crankcase oil, check level daily and drain and refill once each season.

Inspect Commutators — Motor commutators are subject to constant wear from the brushes, and should be inspected regularly. When wear becomes evident the armature should be removed and the commutator turned down in a lathe. Spaces between the bars should be undercut.

Care of Drills

Use of Correct Bits — Every electric drill is designed to a maximum drilling capacity, and use of oversize bits will cause overload and motor burnout. Do not turn down shanks to get an oversize bit into a chuck of smaller capacity. Use only sharp bits. Never use a bit that is not straight.

Protect Chucks — Use proper size chuck key for tightening and loosening the chuck. Run jaws out until the bit is held firmly and then tighten *each* jaw individually. When the drill is not in use, keep the jaws retracted so they are not exposed to blows or bumps. Bumping can reduce drilling accuracy by damaging the spindle on which the chuck is mounted. Do not drop.

Sanders and Grinders

Don't "Bear Down" — Belt sanders, disk sanders and grinders are carefully designed to operate at correct speed for maximum efficiency. *Speed*, not pressure, does the work. The weight of a sander is the pressure desired. Only firm pressure on the grinder is best.

Keep tools clean, check oil and grease regularly and remember to use the proper size grit for the job being done. Never let a sanding belt run against the housing of the sander. Keep all screws tight and parts in alignment.

Size of Extension Cable for Portable Electric Tools

Based on current equivalent to 150 per cent of full load of tool and a loss in voltage of not over 5 volts. This table is for 110-volt tools.

Full load amp. rating of tool	*0— 2.00*	*2.10— 3.4*	*3.5— 5.00*	*5.10— 7.0*	*7.10— 12.0*	*12.1— 16.0*
Distance (one way)	*Wire size (B & S gauge)*					
25 ft.	18	18	18	18	16	14
50 ft.	18	18	18	16	14	12
75 ft.	18	18	16	14	12	10
100 ft.	18	16	14	12	10	8
200 ft.	16	14	12	10	8	6
300 ft.	14	12	10	8	6	4
400 ft.	12	10	8	6	4	4
500 ft.	12	10	8	6	4	2
600 ft.	10	8	6	4	2	2
800 ft.	10	8	6	4	2	1
1000 ft.	8	6	4	2	1	0

NOTE: If voltage is already low at the source (outlet), have voltage increased to standard, or use a much larger cable than listed in order to prevent any further loss in voltage.

Care of Saws

Do Not Overload — Overloading of electric handsaws results from mistaken effort to rush jobs. This can be avoided by the following precautions: Do not jam saw into the work, as jamming causes stalling and serious motor strain. Do not start or stop saws while the saw is in the work. Starting or stopping while stalled also throws overload on the switch and will cause quick burnout.

When the motor gets hot, the insulation burns off the windings and sooner or later a short circuit results. The following conditions will result in a hot motor: (1) overload caused by dull blades, too much lubricant, or forcing the feed beyond capacity; (2) low voltage as a result of poor electrical connections or too light extension wire; (3) lack of ventilation due to clogged air holes or grease in the motor housing; (4) poor brushes, either broken, chipped, or too short. If the motor gets too hot, stop and find out why, then make the necessary repairs or adjustments.

Use Correct, Sharp Blades — Most efficient sawing is assured only when blades are kept sharp and properly set. After a few touch-up sharpenings by the operator, blades should be completely reconditioned by a professional saw sharpening firm. Due to the great variety of materials cut and operations done by electric handsaws, a wide range of blades is available. Use the correct blade for each job.

General Tool Care

Protect Electric Cord — Keep cords free from grease and oil which causes rapid deterioration of the rubber insulation. Avoid kinks, sharp bends, and unnecessary bendings to prevent breaks. Never lay cords over sharp materials which could cut the cover. When cables must be laid, in the path of traffic, they should be protected by parallel planks. Do not carry tools by the cord or jerk the plug from the outlet.

To Protect Operator — from shock most manufacturers equip their units with a three conductor cord. One end of the ground wire is connected to the tool frame, the other end should be attached to a water pipe, properly grounded conduit, or to some permanent ground. This safety device should be used at all times.

Extension Cables — If extension cables are necessary, be sure the extension is made of wire large enough to carry the power to the tool without too great a drop in voltage. A long extension of inadequate size will cause a serious drop in voltage, loss of power and damage to the motor through overheating. Follow the accompanying table for proper wire gauges to be used.

Enhance the beauty of interior beams and rafters by coating with thinned, white shellac that is fresh. The beams and rafters are sometimes antiqued before the shellac is applied.

— *Shellac Information Bureau.*

All Army company commanders have the authority to make men in their command further education if the commander is convinced the man is insufficiently educated to perform his job satisfactorily. — *Wisconsin Military Information Section.*

In the 96-year history of the oil industry in the United States, only 150 wells have ever been drilled below 15,000 feet. Over one third of these wells were drilled last year. — *Petroleum Newsnotes.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

THE 1958 AVA CONVENTION AT BUFFALO

ATTENDANCE at the 1958 American Vocational Association Convention at Buffalo, N. Y., August 11 to 15, should be the aim of all educators who have anything to do with industrial arts and vocational education courses.

Under present conditions this is imperative. Russia is making herculean efforts to outdistance our country in the fields of science, mathematics, technology, agriculture, and business.

In spite of the fact that we need not fear that any country, Russia included, can outstrip the United States' splendid program of education, we who are so vitally interested in education must remember that we must not take our educational job too complacently. For that reason attendance at the 1958 AVA Convention should be considered very seriously, and absence from that meeting must not be based on flimsy excuses.

The chairmen are already busily engaged in putting the finishing touches on the various convention program outlines. As in previous years the following division will be presented at the convention. Agricultural education, business education, distributive education, guidance, home economics, industrial arts, and trade and industrial education. Each of these divisions will have one or more morning or afternoon sessions arranged for teachers of these respective groups.

The first general session will be held at 10:30 a.m., on Wednesday. The Ship's program and dance will be held Thursday at 8:00 p.m., and the business meeting on Friday at 9:00 a.m.

Visits to the exhibits are scheduled for the industrial arts division on Tuesday morning; the agricultural division on Tuesday afternoon; the business division on Wednesday morning; the trade and industrial division Wednesday afternoon; distributive education division on Thursday morning; home economics division, and the vocational guidance division, Thursday afternoon.

Other divisional meetings will be scheduled from Tuesday though Thursday afternoon. Divisional programs or parts of such programs may be programmed from 8:30 to 10:00 a.m., on Tuesday and Wednesday prior to the general sessions on Tuesday and Wednesday.

The convention city was incorporated as a village in 1816, and as a city in 1823. It is an important port on the Great Lakes. It got its name from Buffalo Creek, at the mouth of which Captain Daniel de Joncaire de Chabert, a fur trapper, established a plantation in 1758.

The completion of the Erie Canal in 1822 gave the city a shipping outlet to the east. This was the starting point of the city's growth. In 1896 Buffalo received its first electric current generated by hydroelectric power at Niagara Falls. This further augmented the city's growth as an industrial power.

Its location gives it wonderful facilities for water, rail, and air transportation, and its excellent harbor gives this city a rightful place as one of the largest manufacturing cities in the United States.

Millard Fillmore and Grover Cleveland, both citizens of Buffalo, were elected presidents of the United States. President William McKinley was assassinated in that city while he was attending the Pan American Exposition held at Buffalo in 1901. Theodore Roosevelt, who succeeded McKinley, took the oath of office in Buffalo.

Convention visitors will be well pleased that this city was chosen in which to hold the 1958 AVA Convention.

The University of Buffalo, Canisius College, the D'Youville College, and State Teachers College, are some of the more important educational institutions in Buffalo.

SAFETY SUGGESTIONS FOR VACATION TIME

THE vacation period is usually accompanied by certain dangers. Prepare your students so that they can guard themselves against these dangers as much as possible.

Probably your students can help you. Have them establish a list of the probable dangers that they may encounter. Then have them discuss means for avoiding some or all of them.

As a starter, discuss the dangers encountered while hiking, taking an automobile ride, camping, boat riding, swimming, and diving, when to stay out of the water, climbing trees, flying kites, taking sun baths, eating wild fruits and berries, using polluted water and creek water for drinking, touching poisonous plants, and pursuing some hobbies.

Inform the parents of your students that they should pay special attention to prevent their children from overtiring themselves by hard play, exercise, work, or travel.

Tell the children to take care not to get chilled by swimming for a long period of time in cold water, or by sitting around in wet clothes.

Warn them against using their playmates' towels, dishes, tableware, and the like. Keep them away from playmates who have communicable diseases.

If at all possible have them attend camps or playgrounds where they are well supervised, and where the health supervision is good.

Watch for signs of sickness such as headaches, fever, sore throat, upset stomach, sore muscles or backs, stiff neck, nervousness, extreme tiredness, or trouble with swallowing or breathing.

Have a child afflicted with symptoms such as described above go to bed at once. Keep them away from other children and call a doctor at once.

CLOSING THE SCHOOL SHOP FOR VACATION

IF YOU want to enjoy a happy homecoming to your school shop next September, carefully store away your hand tools, books and pamphlets, instruments, lesson sheets, answer books, rust-proof your power tools, fix up your financial class accounts with the office, tag all your keys and leave them at the office together with your home address and with instructions on how you can be reached throughout your absence if anything should happen that would make your presence necessary at the school.

ARE YOU CHANGING YOUR ADDRESS?

KINDLY remember to notify our circulation department of any change you intend to make in your home or school address. When sending us your change of address, kindly include your old address, and be sure to add the new zone number also.

General Rules and Regulations for the Woodworking Shop

LOUIS BAROCCI
Cudahy High School
Cudahy, Wis.

1. The school shops are places of purposeful activities where the student must direct all of his undivided attention to his work. It is not a place for shouting, whistling, loud talk, disorderliness, or *horse play*. Order, good discipline, and an *atmosphere of industry must prevail at all times*. The student who fails to adjust himself to this standard of work and discipline subjects himself to dismissal from all shop classes.

2. A deposit of approximately 50 per cent of the estimated cost of a project is requested before starting work on it.

3. Do no sawing of lumber without getting an O.K. from the teacher first.

4. No student shall *clean up* at the end of the shop period until the cleanup order is given by the teacher.

5. At cleanup time, put your tools and work away, brush off the bench top and promptly take care of your cleanup assignment. Hang up your brush on the side of your bench.

6. All stock that fits in bench drawers should be kept therein. Long stock can be stood up on end below the windows and assembled projects are to be placed upon the shelves.

7. Lay out your stock so as to produce a minimum of waste.

8. Unused screws and nails should be returned to their proper receptacles and not put in the bench drawers.

9. Used sandpaper should be placed in the sandpaper box and not in the bench drawers.

10. Varnish cans and plastic wood cans must be covered tightly after use. Step on the cover with your foot or tap the edge gently with a mallet.

11. Do all shellacking and varnishing in the finishing room.

12. Do staining and polishing in the shop room, not in the finishing room.

13. Oily or soiled rags should be placed in the safety container.

14. If you have a question, ask your teacher. Do not ask another student. He may give you the wrong information.

15. No job or project is to be started without permission from the instructor.

16. No project is to be stained, shellacked, or varnished without getting permission from the instructor.

17. Projects are to be put away safely at the end of each shop period.

18. The entire class will be responsible for missing tools or willful damage of equipment unless the student responsible makes amends.

19. No project is to be taken home until it is paid for in full.

20. At dismissal time, wait for the instructor's signal to leave and *not* the bell signal.

21. Students are to enter and leave the shop in an orderly manner.

22. Tools should be handed to another person with care. Do not throw them. as some tools have sharp or pointed edges.

23. If you temporarily run out of work, see your instructor for a task assignment.

24. Do not work toward your body with sharp tools; always work away from your body and hands.

25. Keep your tools sharp. When they *become dull* sharpen them or see your instructor.

26. Students are not allowed to use the circle saw, planer, jointer, or band saw without *teacher supervision*.

27. Students can work on the lathe, drill press, and sanding machines unsupervised only after being properly instructed.

28. Only one student at one machine at a time. Other students should wait for the machine at a safe distance. Do not *gang* up around a machine or some bench.

29. Do not remove guards from the machines. The teacher will do this when necessary.

30. Before a student can start a project, he has to prepare an acceptable working drawing or picture of the project and figure the estimated cost of the project.

31. Students cannot work in the school shop without teacher supervision at any time. (This refers primarily to free periods.)

32. Cultivate personal caution at all times. This is one of the big lessons to be learned in shopwork.

Some objectives and educational values of woodwork and what it should do for the boy are listed below:

1. It affords exploratory opportunities for the boy wherein he can discover manipulative interests and abilities when working with wood.

2. It should develop in each pupil an appreciation of *good workmanship*.

3. It should develop in each pupil the habit of orderly method of procedure in the performance of each job.

4. It affords craft experience for leisure time interests or vocational pursuits.

5. It provides handiwork experience with a variety of tools, materials, and machines.

6. It makes of the students a more intelligent consumer of materials related

to wood and the manufacture of wood products.

7. It affords some training and experience for minor jobs.

8. It improves the school morale of many boys who are not academically inclined.

Shop Conduct for Success

1. *Be on time.* Time lost can never be regained.

2. *Be attentive.* Use your head. Think — ask questions. Watch the instructor. Read assignments. Hand in required work on time.

3. *Be careful.* If you notice anything which does not seem to be as it should, inform your instructor at once.

4. *Be cheerful.* Everyone admires a happy disposition.

5. *Be courteous.* It not only makes you feel better but it is right.

6. *Be proud.* Do your job better than anyone else can do it. Keep your bench and tools clean, orderly, and in good condition.

7. *Be a man.* Treat the other fellow as you wish to be treated. Think it over. No one likes a vulgar act or *shady* story. Virtually all mankind is decent and you will find decency if you give it.

8. *Be faithful.* Can you be trusted to do the things you are asked to do? Think it over. When you are given a job, you know it is because there is something of benefit to you in doing the job.

9. *Be thorough.* Whatever is worth doing at all is worth doing well. Never compromise your high standards for you run the risk of failure the moment you do so.

10. *Be honest.* This is the most highly respected virtue of mankind.

The Joy of Work

A great deal of the joy of life consists in doing perfectly, or at least to the best of one's ability, everything which he attempts to do. There is a sense of satisfaction, a pride in surveying such work — a work which is rounded, full, exact, complete, in all its parts which the superficial man, who leaves his work in a slovenly, slipshod, half-finished condition, can never know. It is this conscientious completeness which turns work into art. The smallest thing well done becomes artistic. — *William Mathew.*

Reflections and Words to Live By

1. Better wear out than rust out.

2. The boy is more important than the project.

3. It isn't the whistle that pulls the train.

4. The hobby craftsman does more than build things — he builds himself.

5. The most beautiful pieces of wood are sometimes found in the scrapbox.

6. Excuses are like sawdust and glue, they are not used by good workmen.

7. A cutting tool is no better than its edge.

8. A tactful man can pull the stinger from a bee without getting stung.

9. Observe the woodpecker — he gets there by using his head.

10. No time is lost in grinding.

11. Little things are important, consider the sliver.

12. Do small things in a big way.

13. Character is to man what carbon is to steel.

14. To thine own self be true.

15. What the project does to the boy is of greater consequence than what he does to the project.

16. Hard work is the master key to the door of opportunity.

17. It is not easy to straighten in the oak the crook that grew in the sapling.

18. Don't lie. It is sure to trip you in the end.

19. Give your employer more than he expects, and he will give you more than you expect.

20. Don't kick if your boss keeps correcting you. If he thinks you are worth keeping he will take time to correct you. He will not waste time cutting specks out of *rotten apples.*

21. Measure twice, cut once.

22. No man is his crafts master the first day.

23. He who knows it all has a lot to learn.

24. When you play, play hard and when you work, don't play at all.

25. Take time to cultivate friends.

26. The fellow who is pulling on the oar has no time to rock the boat.

Problems and Projects

MODERN YARD LAMP

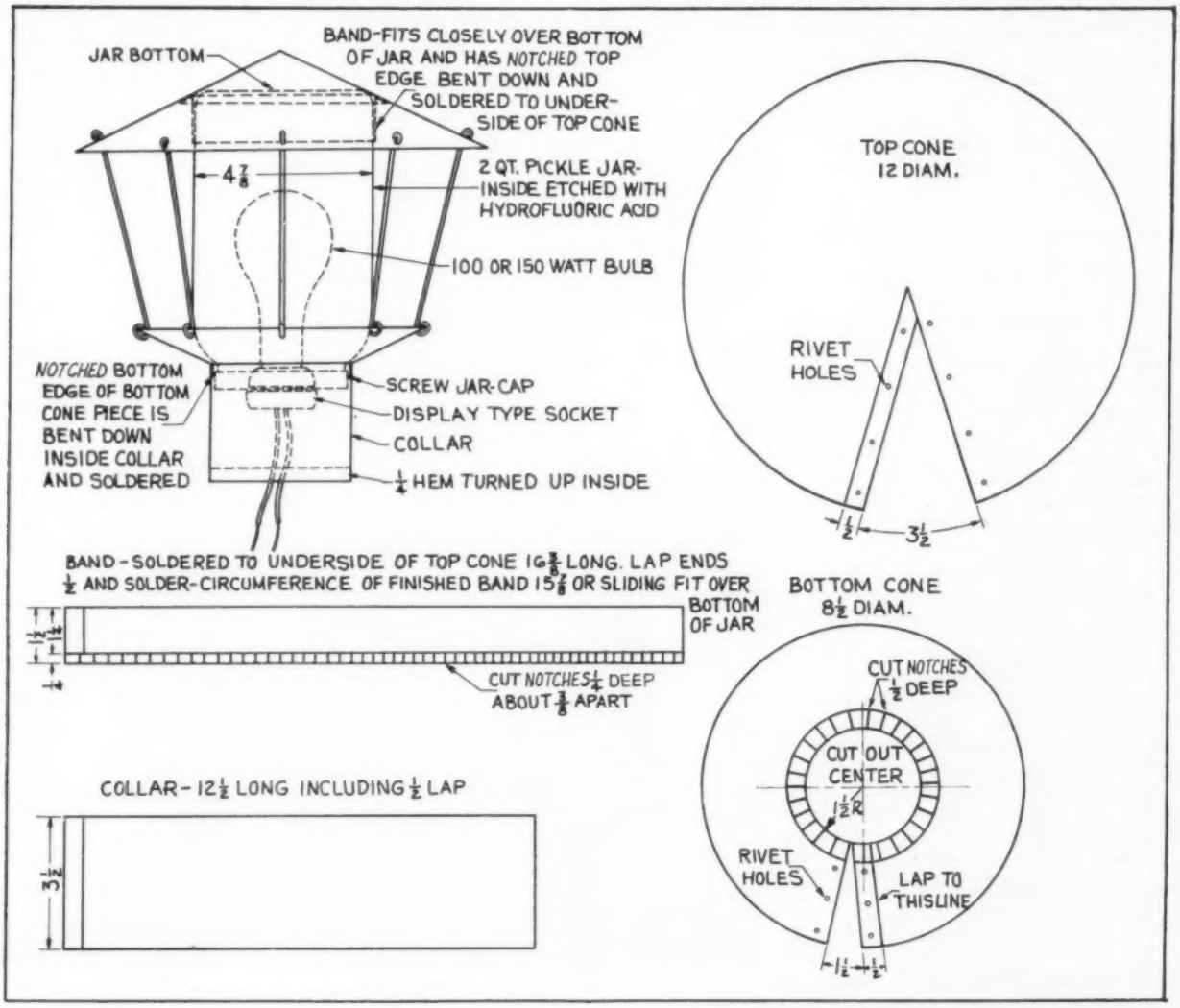
R. E. ESSON
Instructor of Electricity
Albert Lea High School
Albert Lea, Minn.

The project described herewith is suitable for construction in either a metal or an electrical class.

The metal used may be copper, brass, aluminum, or galvanized iron. If galvanized iron is used, it should be painted. The other metals will look very fine when polished and coated with clear lacquer. The original lights were made of copper, and copper will be mentioned throughout this article, but it is understood that the other metals may be used just as well.

The body of the lamp is made from a one-half gallon pickle jar. There are many jars of this size on the grocer's shelves, but one should make sure that the neck

A modern yard lamp


JAR BOTTOM
BAND-FITS CLOSELY OVER BOTTOM OF JAR AND HAS NOTCHED TOP EDGE BENT DOWN AND SOLDERED TO UNDER-SIDE OF TOP CONE
4 7/8
2 QT. PICKLE JAR-INSIDE ETCHED WITH HYDROFLUORIC ACID
100 OR 150 WATT BULB
NOTCHED BOTTOM EDGE OF BOTTOM CONE PIECE IS BENT DOWN INSIDE COLLAR AND SOLDERED
SCREW JAR-CAP
DISPLAY TYPE SOCKET
COLLAR
1/4 HEM TURNED UP INSIDE
TOP CONE 12 DIAM.
RIVET HOLES
1/2
3 1/2
BAND - SOLDERED TO UNDERSIDE OF TOP CONE 16 3/8 LONG. LAP ENDS 1/2 AND SOLDER-CIRCUMFERENCE OF FINISHED BAND 15 7/8 OR SLIDING FIT OVER BOTTOM OF JAR
CUT NOTCHES 1/4 DEEP ABOUT 3/8 APART
BOTTOM CONE 8 1/2 DIAM.
CUT NOTCHES 1/2 DEEP
CUT OUT CENTER
1 1/2 R
RIVET HOLES
LAP TO THIS LINE
1 1/2
1/2
COLLAR - 12 1/2 LONG INCLUDING 1/2 LAP
3 1/2

Detail drawing of the modern yard light

opening is large enough to admit a one hundred-fifty watt light bulb. It was found that the jar could be etched or frosted very easily with about two tablespoonfuls of hydrofluoric acid. After the acid is poured into the jar, it is covered with a loose fitting top. When thirty minutes have elapsed, the acid may be poured out, and the inside of the jar will be etched from the fumes of the acid.

Procedure

Cut out the four main pieces — the top cone, the bottom cone, the band, and the collar — using the drawings for the information needed.

Bend the top into its conical shape by hand. Drill or punch the four rivet holes, insert the rivets and set them.

Cut the band to size and cut notches along one edge as shown in the working drawing. Bend into a circle by wrapping it around a round object or by using the forming rolls if they are available. Lap the ends of the band one half inch and solder. Bend the tabs formed by the notches outward and down. They are bent about one hundred and twenty degrees in all, to make them fit smoothly against the underside of the top cone piece. The band should be centered on the underside of the top cone piece and the tabs soldered to the cone all the way around.

The bottom cone is cut to size, with a three inch hole cut in its center. Notches are cut around the perimeter of the center hole. They should be ½-in. deep and about ⅜-in. apart. The triangular segment is cut out, as shown, and discarded. The rest is then bent into a conical shape and riveted.

The collar piece is cut out, formed into a circle, the ends lapped, and then soldered. The bottom cone is then placed on the collar piece, and the tabs on the cone are bent down on the inside of the collar and soldered.

Nine equidistant holes are drilled around the outside edges of the top and bottom cone pieces. These holes are drilled ⅞ in. from the edge of the top cone and ¼ in. from the edge of the bottom cone, and they should be large enough to pass the number ten wire that will connect the two cones together.

Cut nine pieces of number ten bare copper wire eight inches long and form a one quarter inch loop in one end of each piece. Place the top cone on the bottom of the jar and the bottom cone over the top of the jar. Slide the nine pieces of wire

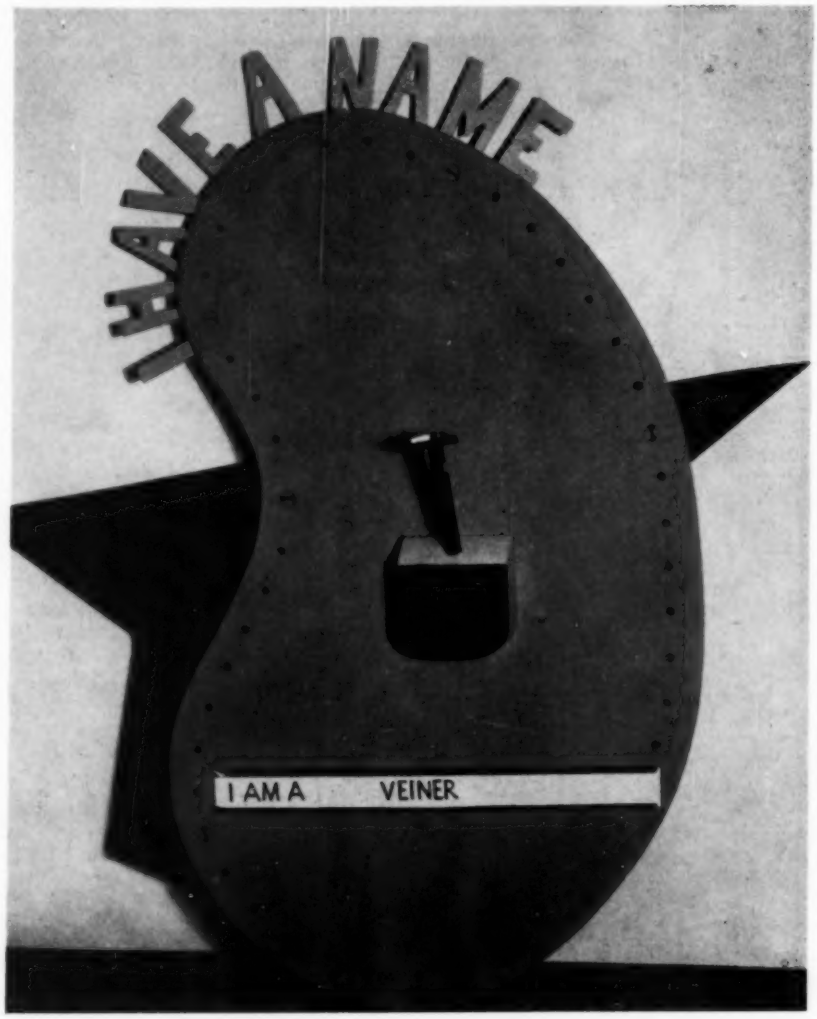
through the holes in the top cone and down through the holes in the bottom cone. Bend a loop in the wires just below the bottom cone. This loop should be bent up and over the edge of the cone as shown in the drawings, and the surplus wire cut off. Care should be taken to keep all the wires the same length in order to keep the two cones in alignment.

Drill a hole in the center of the jar lid large enough to permit the mounting of a display type socket — this hole will be about 1⅜ in. in diameter, but should be made to fit the particular socket used. Mount the socket through this hole, and drill a series of one eighth inch holes through the jar lid around the outside of the socket. These small holes are for ventilation and their size and placement are not critical.

A one hundred watt or a one hundred and fifty watt light bulb may be screwed into the socket and the lid slipped up inside the collar and screwed onto the neck of the jar.

A post slightly smaller than the collar should be used to mount the light, and a layer or two of rubber tape wrapped around the top of the post will give a snug fit as the light is pulled down over it.

Underground cable should be run to the light and should pass through a hole in the post just below the surface of the ground. The underground cable should go up through the post and connect to the short leads from the socket. Either clamps or solder should be used on these connections and they should be well taped. Enough slack is left in the wire inside the post to permit the lifting off of the light to change bulbs.



A teaching aid for teaching tool recognition

MORE EFFECTIVE TOOL RECOGNITION THROUGH BETTER TEACHING AIDS

ED ROBERTS
Whittier High School
Whittier, Calif.

Industrial and vocational education teachers are always faced with the problem of finding more effective ways to teach *tool identification.*

This, "I have a name," tool display board is one of the more favorable ways to bring new interest in tools and their proper names.

This display board was constructed for handicrafts classes to display the vast array of saddle stamps and jewelry-making tools.

The tools are placed in the special holder and after several days the name tag is inserted and attention is called to the tool at this time. Two or three different tools may be easily displayed each week. It is interesting to note the amount of student interest when each new tool is displayed.

This teaching aid is adaptable to any shop. Interesting textures from new materials and the new colors in paint, plus an interesting "Free Form" enhances the purpose for which this board is intended. It is an eye-catching center in any setting.

WHITTLING PROJECT— BAKUBA, A CENTRAL CONGO MASK

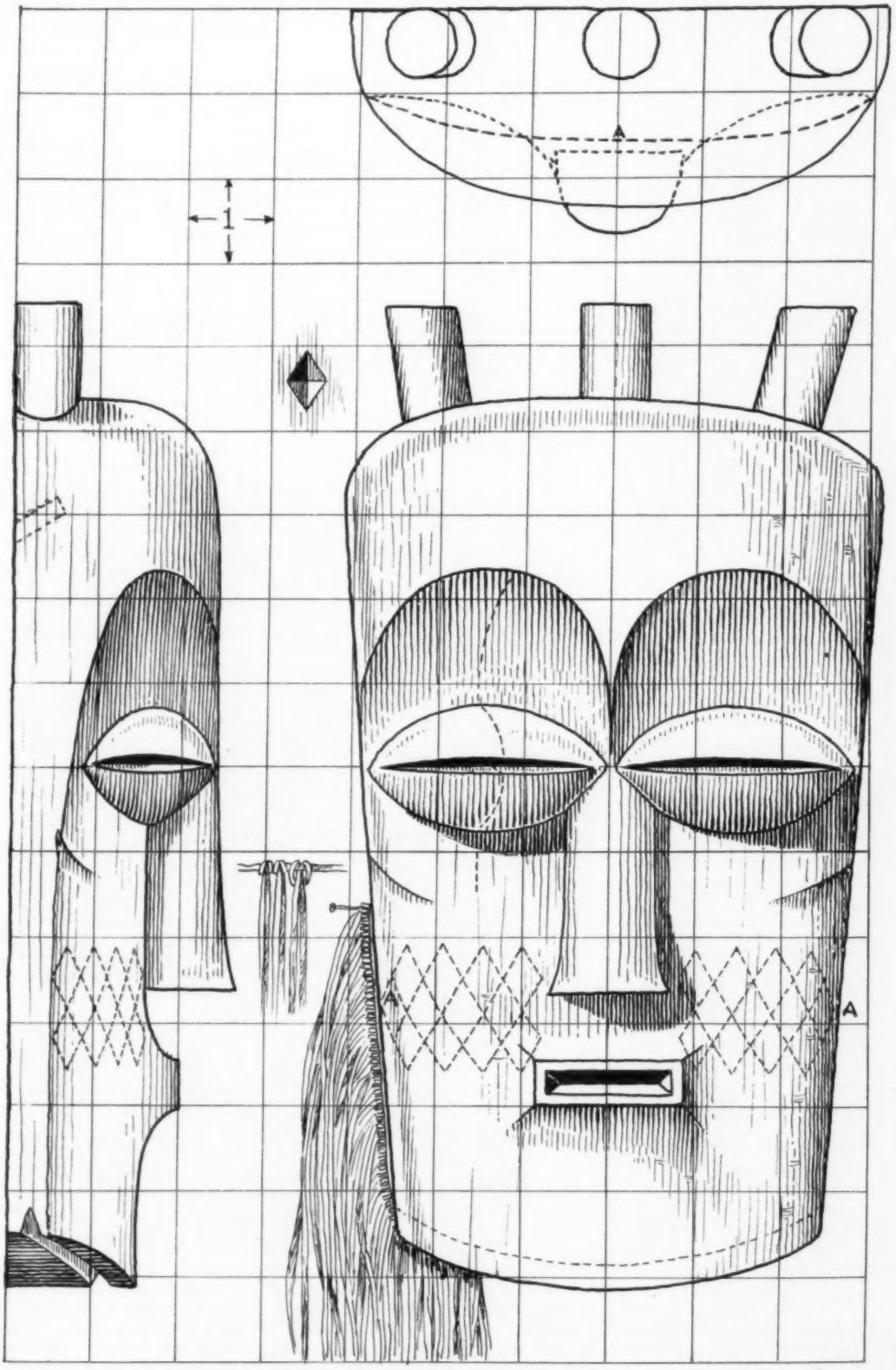
BEN HUNT
Hales Corner, Wis.

This colorful Bakuba, Central Congo mask, makes a very attractive wall decoration for a den or living room. It was made from an illustration that appeared in *Life* magazine some time ago. The original had a sort of leather cap that fitted over the back of the head but for our purpose this was left off, so the mask will hang flat on a wall. As with other masks in this series, no attempt has been made toward authenticity other than the general appearance. The back is perfectly flat and not gouged out to fit the face.

The over-all size, when enlarged to 1-in. squares, makes a mask 11 in. high. However, I think if I had to do it over again, I would make it about 9 in. high. Probably use 13/16-in. squares instead of 1 in.

The ornamentation on the cheeks is a bit more regular than on most masks of this character. This may be painted on with black and white triangles, or it can be incised in a chip carving manner, and then painted. Incising is easily done with a small sharp knife blade.

The over-all color is burnt orange with the white and black as shown in the photograph. Use a flat paint. I used poster color and when dry, a plastic spray to set it.



Details of the Bakuba Mask – Central Congo

Bakuba Mask by Ben Hunt

Do not spray too heavily or you will have shiny spots here and there.

Make the beard of raffia, dyed the same burnt orange color. It is first looped over a strand of the same material as shown in the sketch. Cut a V groove around the bottom edge of the mask to hold the beard out to the front edge and tack it on the sides with small brads.

Drill a small slant hole in the back to hang it.

A word about primitive art objects in the home. For the most part, people are rather reluctant to display them. This is probably because these things are not for sale in every furniture store. However, smart shops are showing them when they can get them, and the pieces they show are usually plaster casts of the originals. The originals are collectors' items and they bring rather fancy prices.

One lonely mask in a living room will naturally look out of place unless it ties up with something of a similar nature or character, often one or more additional masks.

So whittle two or three of these masks and group them in an appropriate wall space or perhaps over the fireplace. You don't have to have an African or South Sea setting for them. They will grow on you and they most certainly will break any existing monotony.

To apply spackle quickly to unfinished wood, first give the wood a thinned coat of fresh, white shellac.

— *Shellac Information Bureau.*

POTTERY GREASE LAMPS

GEORGE R. HORTON
Director of Industrial Arts
Urbana City Schools
Urbana, Ohio

The accompanying illustration presents designs of a primitive American lighting device. These lamps were turned on the wheel by local potters in the late eighteenth and early nineteenth centuries. They were found in the middle Atlantic states where blue clay was prevalent. Original lamps of this type are fairly rare and quite desirable as antiques.

A wick was supported by the lip or beak in the cup-shaped reservoir. The reservoir was then filled with grease (animal fat) to provide the fuel. The saucer base gave stability and served as a catch for stray dippings. Heights generally ranged from five to seven inches with other dimensions in proportion to the illustrations.

This illustration might provide an interesting ceramic project for the potter's wheel. For more authenticity, the grease lamp should be fired with clear glaze to maintain the red color. The finished project will result in a fine conversation piece and also serve a utilitarian purpose as a novel ashtray.

Loaded barges, each holding 10,000 or 12,000 barrels of petroleum products, can travel from Lake Charles, La., to Pittsburgh, Pa. — a distance of 2200 miles. The trip takes 25 days. — *Petroleum Newsnotes.*

STORAGE OF LUMBER

RALPH C. MAYO
Teacher-Coach
South High School
Worcester, Mass.,
and Industrial Arts Instructor
Worcester Academy

It is said that neatness, orderliness, accuracy, and cleanliness are the cornerstones for success in drafting. This saying can also apply to a lumber room where expensive lumber is stored.

One of the first lessons a teacher of woodworking should give is on the care and use of the lumber room. In the illustration shown herewith, we see a student removing a 14-ft. board from a neat lumber rack. This senior knows that every pupil, after he squares off one or more pieces for himself, should stack the board in an orderly fashion so it will not twist or warp.

The lumber storage rack in use

Remember how upset you were as a student when you picked out a beautiful grained board for a coffee table, only to find the board was twisted and warped so that it could not be used. Someone, carelessly, had stored the long piece on a short board.

Safety First

Be sure your lumber rack is strong enough to hold your lumber. In the picture you will notice that ½-in. stock is on top with planks on the bottom.

MODERN WROUGHT IRON LAMP

GILBERT N. LIETZ
Industrial Arts Instructor
Mathewson Junior High School
Wichita, Kans.

The modern wrought iron lamp, shown herewith, is easily made on the Di-Acro Bender No. 2 by following the procedure listed below. If a bender is not available, heat material and bend to shape.

Procedure

1. Cut material to length.
2. Bend base on Di-Acro bender using 3/16-in. radius pin.
3. Drill ⅛-in. holes in center of base corners. If desired, drill ⅛-in. holes ¼ in. deep from the bottom and silver solder ⅛ in. rod in same for legs. See drawing.
4. Bend post on Di-Acro bender using 1½-in. radius collar.
5. Cut ⅛-in. pipe threads on top end.
6. Hollow out the bottom end to fit base.
7. Clean joint and end of post to be soldered thoroughly.
8. Mount pieces in position and silver solder using 45-deg. silver solder and Bernz-O-Matic Propane torch with utility tip. May use welding torch if available. Silver solder is preferred on most small wrought iron projects because it makes a neat looking joint having a minimum of cleaning.
9. Place rivets in leg holes and cut to correct length which is determined by length of rubber tip. Rubber tip should fit up tight against base.
10. Upset rivets on anvil using rivet set and hammer. This will secure rivets tightly in the holes.
11. Clean lamp and paint with flat black spray paint in pressurized can.
12. Assemble lamp parts
    a) Cord can be installed best by first putting the beaded chain through the post and then attaching cord to chain.
    b) Drill ⅜-in. hole in shade for swivel. See photographic illustration.

Fig. 1. Wrought iron lamp

BILL OF MATERIAL

No. of Pcs.	*Material*	*Size*
1	Round mild steel	⅛ in. round by 2 ft. long
1	Black pipe	⅛ in. by 2 ft. long
3	Rubber Tips*	No. 3T by ⅛ in.
3	R.h. rivets	⅛ by ¾ (cut to correct length)
9 ft.	Cord and plug	
1	Fiberglas shade No. 912	
1	Swivel — No. 928	
1	Socket — No. 1741	
3	Nuts, brass No. 331 or larger (used to mount shade to swivel — double nut inside)	
	Desirable, but not necessary:	
3 ft.	Beaded chain No. 3139	

*Available from Lavelle Rubber Co., 424 N. Wood St., Chicago 22, Ill.

All lamp parts can be ordered from The Gearon Co., 3544 West 26th St., Chicago 23, Ill.

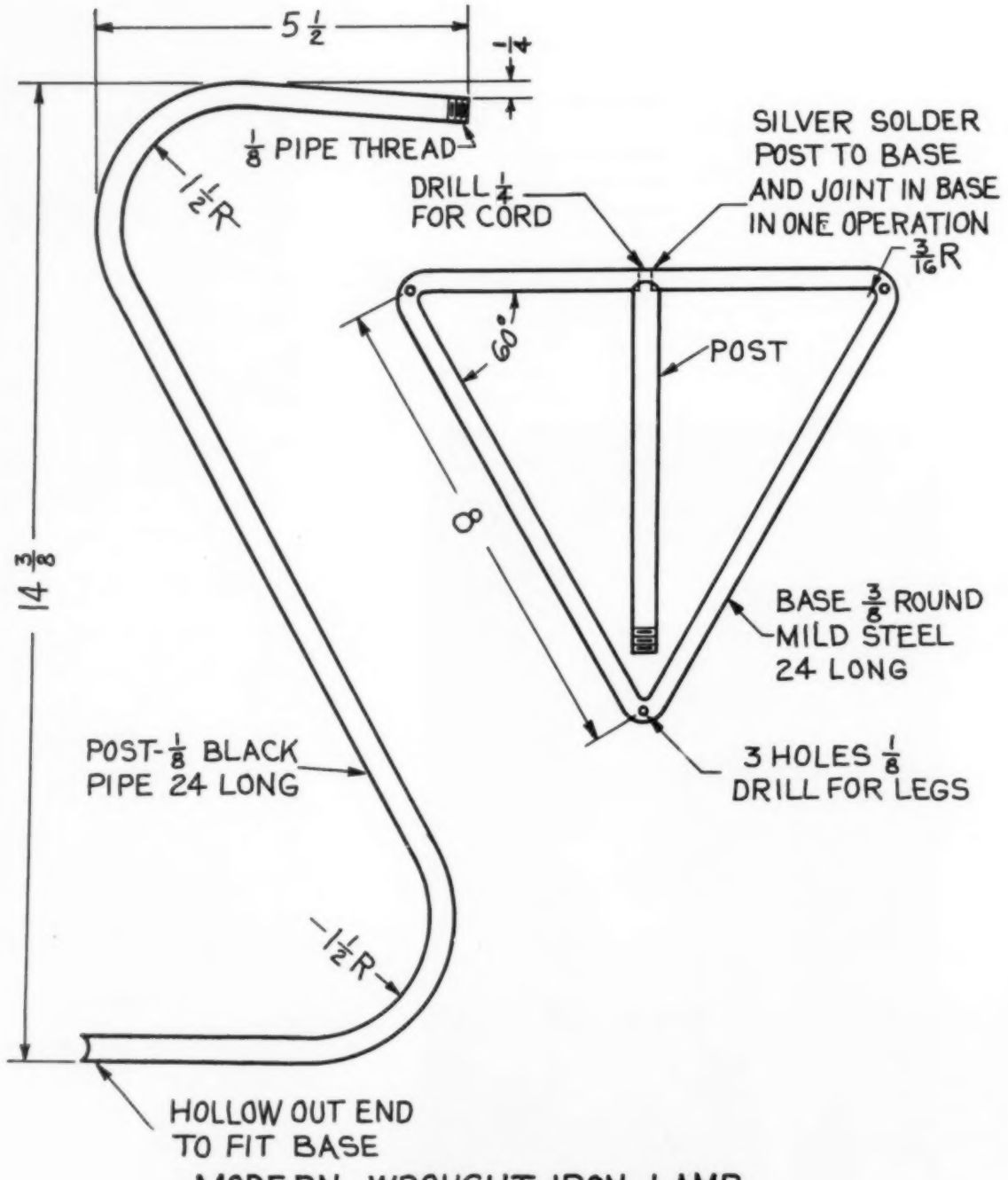


Fig. 2. Details of the wrought iron lamp. See article on page 189

MULTIPURPOSE DRAWING AID

JOHN S. KREMPA
Industrial Arts Department
Mohonasen Central School District
Schenectady, N. Y.

It is rather universally accepted that drawing, as a tool, is a fundamental language necessary in transmitting many ideas. However, the levels of understanding and abilities in these areas are so varied that it seems necessary to develop some method or device which can be used advantageously by the varied groups. The drawing aid discussed here is not a new idea. It is rather an improvement over some existing practices.

Since the tracing box was completed over one year ago, it has been used frequently and successfully by students from grades seven through twelve. Although it is essentially a tracing box, the amount and distribution of light transmitted enable it to be used to do accurate tracings in drafting up to size 24 by 36. It can also be used to make masters for reproduction of ditto, mimeograph stencil, the multilith process, contact prints, blueprints, etc. The box can also be used for effectively back-lighting various shop displays, as shown in Figure 1, and also for making templates used on wood lathes. There are numerous other uses depending on the instructor's ingenuity.

The following examples are merely some of the many hidden uses of this aid. In this shop it is used to trace various designs by the students. The visibility is much sharper with less eyestrain at the same time greatly reducing the amount of time to make drawings by other methods. If the tracings are of smaller subjects, e.g., animals and the like, several boys can use the box simultaneously. See Figure 2. If however, the drawing requires considerable amount of precision and accuracy, one student can use it with all necessary drafting equipment. Another feature for the latter use is that the areas not used can be easily blocked

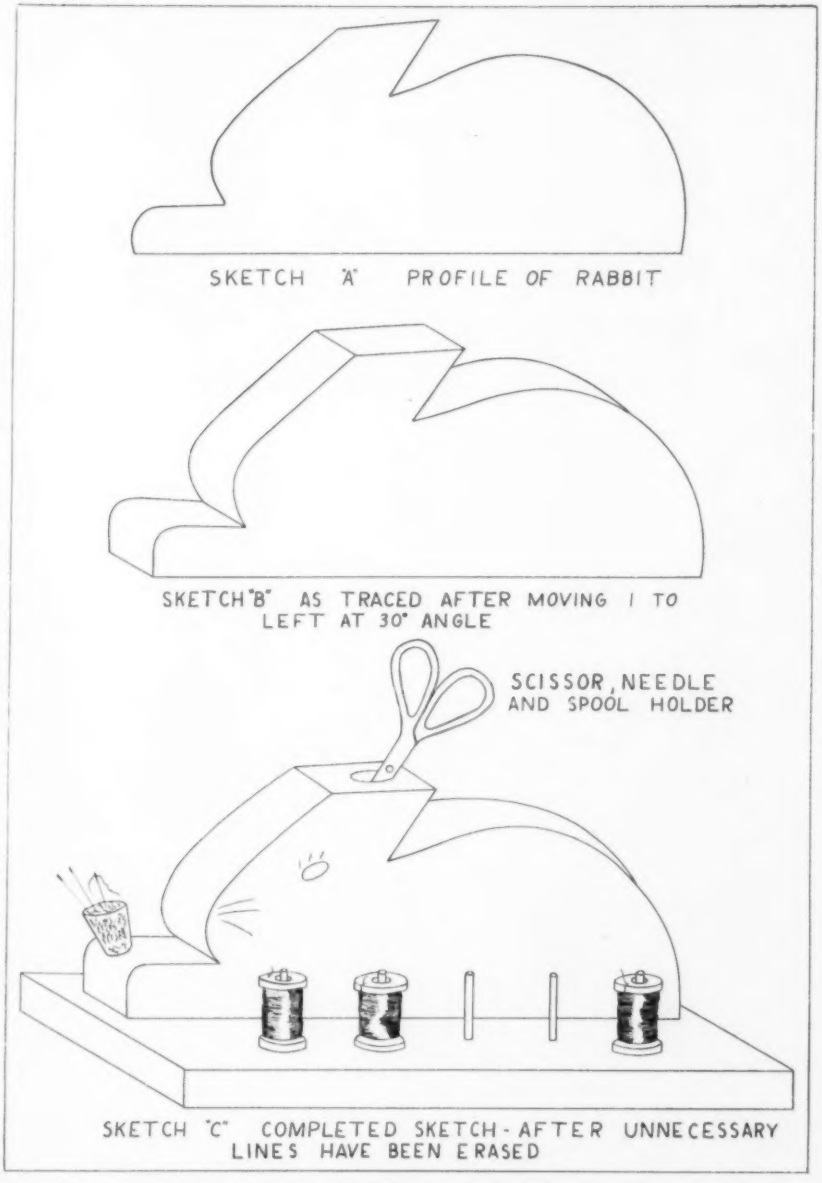

SKETCH "A" PROFILE OF RABBIT
SKETCH "B" AS TRACED AFTER MOVING I TO LEFT AT 30° ANGLE
SCISSOR, NEEDLE AND SPOOL HOLDER
SKETCH "C" COMPLETED SKETCH - AFTER UNNECESSARY LINES HAVE BEEN ERASED

Fig. 4. Sketches A, B, and C

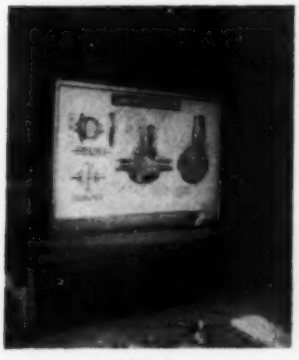


Fig. 1

Fig. 2

Fig. 3

Fig. 5

Fig. 1. Using the box for back-lighting a chart. Fig. 2. Several students using the box at the same time. Fig. 3. Blocking out unused areas, and Fig. 5, which shows the mounting of the fluorescent tubes

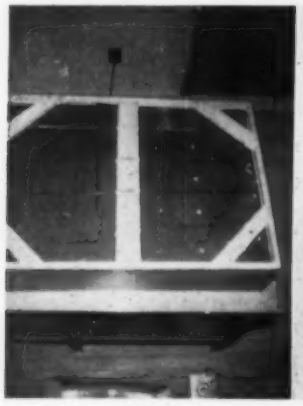


Fig. 6

Fig. 7

Fig. 6. Bottom view showing reinforcement.
Fig. 7. Using the concealed switch

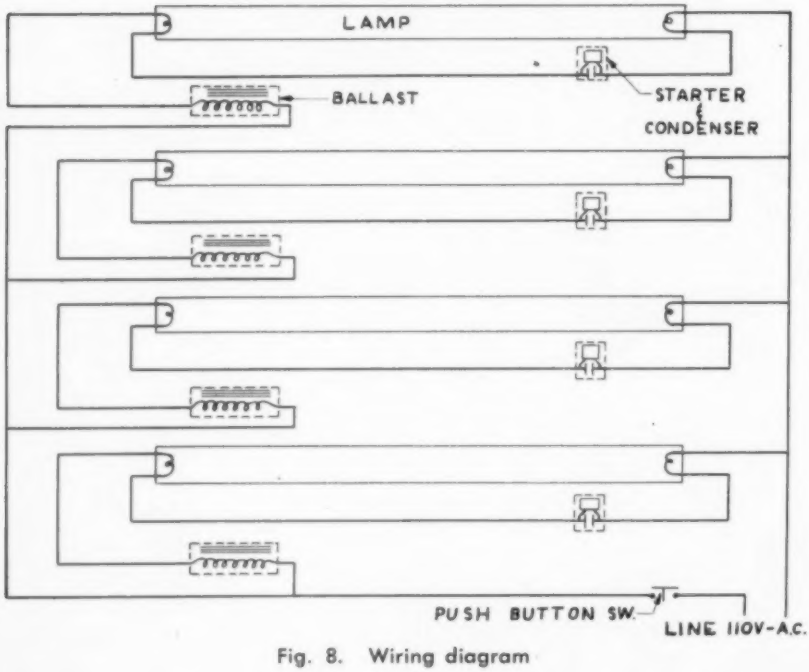


Fig. 8. Wiring diagram

out by merely pulling the two shades into position. See Figure 3. This is especially helpful in preventing eyestrain if student will be using the box for any length of time. Another use for this box is as an aid for students in making oblique drawings, freehand. Very often youngsters in the shop have difficulty in making a pictorial sketch of their project. Many of these projects can be portrayed by an oblique drawing. The following example presents the method used by this instructor in teaching boys in the shop how to make an oblique drawing. This method is not to be confused with the technically correct method of teaching oblique drawing in the drafting room. First trace the animal, a rabbit in this case. Then merely move the top sheet to the right, or left, 1 in. at a 30, or 45 deg. angle and retrace the rabbit. Now connect the sharp corners and erase unnecessary lines. The completed drawing can then easily be traced on the final plan sheet within a matter of minutes. See sketches a, b, c. See Figure 4.

The box has been used in this shop for over a year and has not only improved the quality of the work but also increased the interest of youngsters in drawing. Besides that, it has shortened tremendously the instructor's time in making various drawings for reproduction purposes.

Since this school uses the multilith process to a great extent, other teachers, e.g., physics, biology, etc., also have used the device to advantage. This is especially important if the reproductions must be clear and fine detail is necessary.

The construction presented here is very general since the instructor can easily adapt any desired design for his particular purpose. The box, as described, excluding drying time for glue and paint, was constructed in approximately four hours.

Note that the fluorescent tubes are mounted independently. This is not only cheaper but also permits flexibility so that the entire top glass surface has an equal amount of light. Using four 25 watt tubes in a box 7 in. deep, the surface light on the glass is 200 ft. candles uniformly distributed. The lights are wired parallel. This enables use of any combination of lights within. Running the wires beneath the masonite makes a neater appearance and prevents unnecessary deflections of light to the surface. The transformers may also be mounted below the masonite. Holes in ends are for ventilation and very useful as aid for moving box from place to place. See Figure 5. By painting the inside a flat white, it is not necessary to frost the glass in order to prevent glare. The glass should be rather thick for safety reasons. Plate glass, in most cases works very well. The corners of this box were toe nailed and reinforced with triangular glued joints. The bottom view shown in Figure 6, presents one of the many ways which can be used for gaining strength and rigidity. Using a concealed push button switch eliminates the possibility of it being broken off. See Figure 7. To remove the glass merely tilt the box on edge.

Basic general construction:

1. Use 1 by 8-in. pine and cut to lengths desired.
2. Rabbet one edge depth equal to thickness of glass.
3. Glue and nail parts together; use reinforcements.
4. Cut out necessary slots to strengthen base.
5. Glue and fasten the diagonal pieces with 1½ by 8-f.h. screws.
6. Cut out masonite and nail to base strips.
7. Drill necessary holes for mounting fluorescent sockets, transformers, and also for ventilation and carrying.
8. Paint box a flat white inside, and any desired color on the outside.
9. Wire as indicated in diagram, Figure 8.
10. Insert glass.
11. Mount shades. Any old shades painted flat black work nicely.

Westinghouse Fluorescent Lamps

Lamp[1]	*Base*	*Rated av. life hours*	*Rated initial lumens cool White*
15W 18 in. T-8	Med. Bipin	7500	620
15W 18 in. T-12	Med. Bipin	7500	580

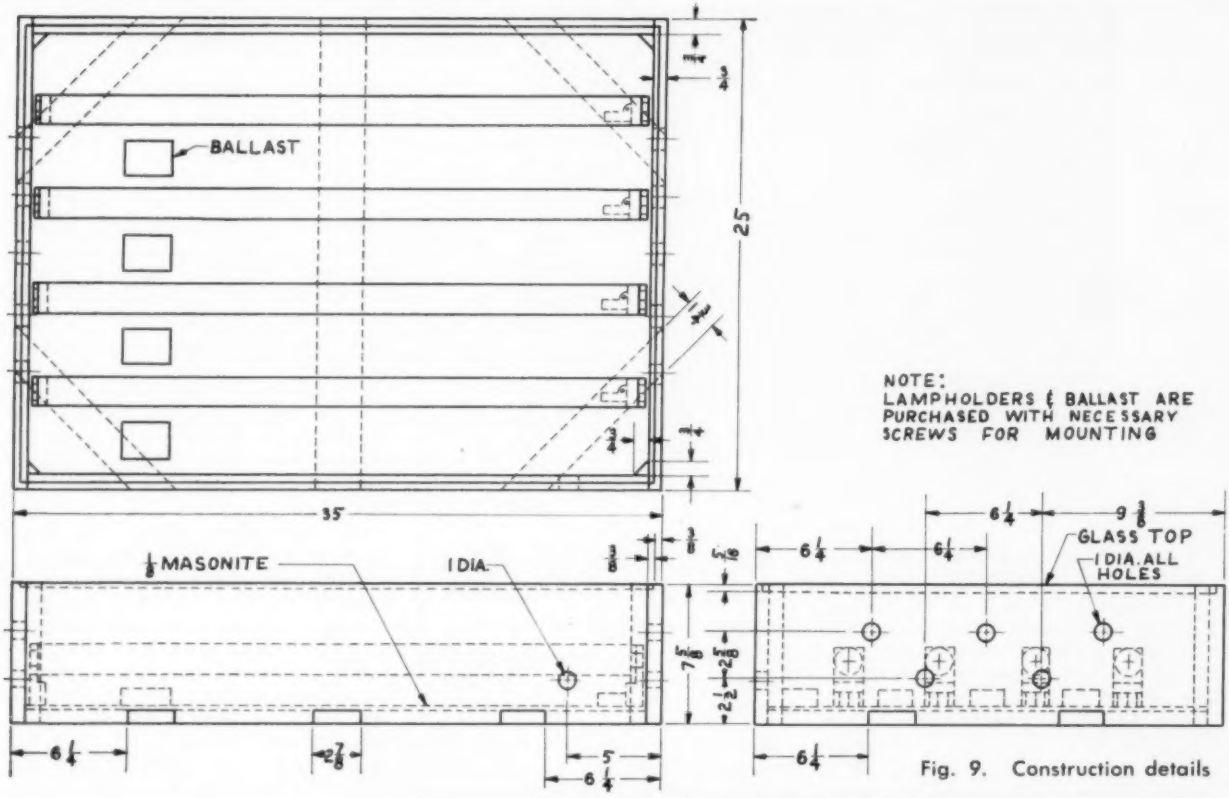


Fig. 9. Construction details

Lamp[1]	Base	Rated av. life-hours	Rated initial lumens cool White
20W 24 in. T-12	Med. Bipin	7500	915
25W 33 in. T-12	Med. Bipin	7500	1370
30W 36 in. T-8	Med. Bipin	7500	1530
40W 48 in. T-12	Med. Bipin	7500	2370

[1]Nominal lamp watts and lengths of tubes. Must add two standard lampholders to obtain over-all lengths. T stands for tubular and the number following T indicates tube diameter in eighths of an inch.

A METHOD FOR STORING WOODWORKING CLAMPS

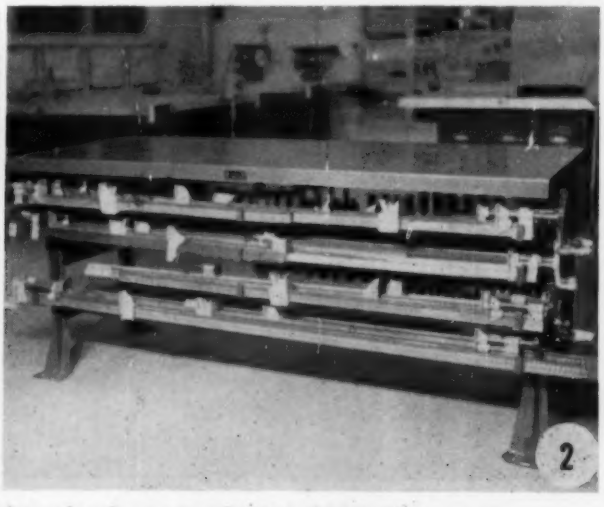
J. RUSSELL KRUPPA
Instructor, Bald Eagle Nittany Area
Joint School System
Mill Hall, Pa.

The problem of storing clamps which are used in the woodworking area often leads to the building of a special clamp rack which may be far removed from the glue bench.

If you desire to keep your clamps handy to the glue job you may find the method described in this article helpful.

Making Your Glue Bench Serve As a Clamp Rack

To hold the cabinet (bar) clamps, make brackets as shown in Figure 1 and bolt them on the bench legs on one side of the bench. The size of the brackets and their positioning will depend upon the number of clamps to be stored. The brackets in



Figs. 1 and 2, and Fig. 3 on the next page show how the clamps can be stored in various ways

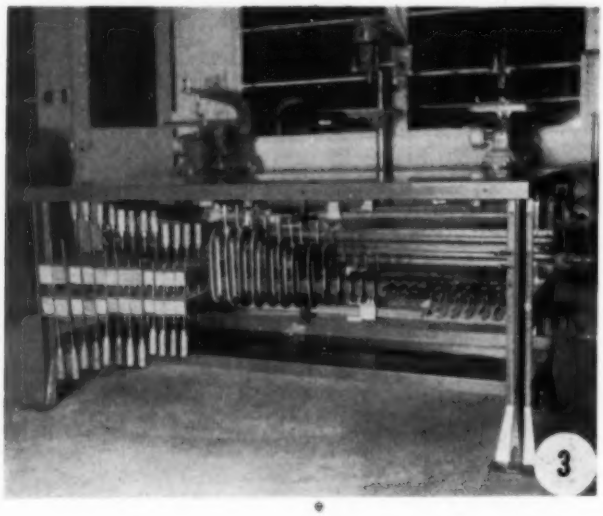


Figure 1 hold 18 cabinet clamps of various sizes as shown in Figure 2.

The space under the bench top down to the floor can be used to store hand screws, C clamps, and handy (spring) clamps. See Figure 3. A 2 by 4, upon which the clamps are fastened, can be fastened to the 2 by 4 braces which are bolted between the legs on each end of the bench as shown in Figures 1 and 3. The vertical and horizontal position of the bracket and braces will depend upon the size of the clamps to be stored.

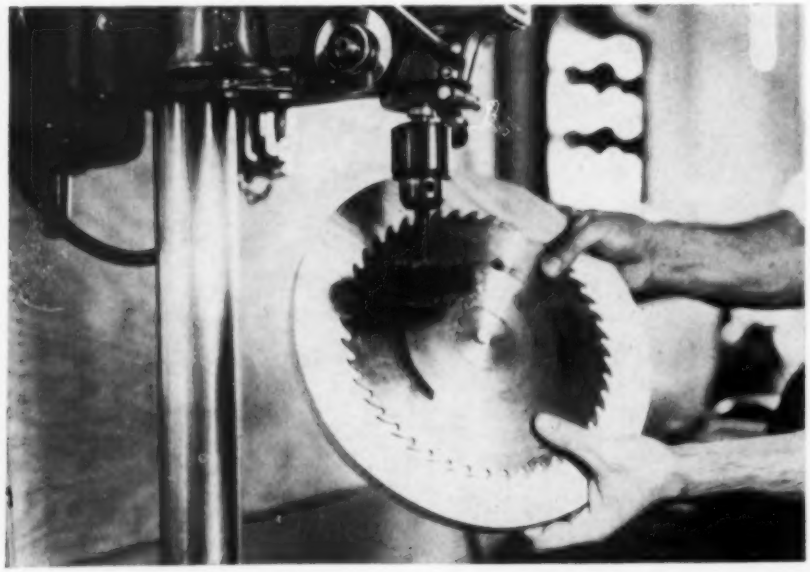
The glue bench with the brackets arranged as described above not only provides a method for storing all your clamps in a neat and orderly fashion, but also stores them where they are readily accessible to the job.

REMOVING RESIN FROM CIRCULAR SAW BLADES

J. RUSSELL KRUPPA
Industrial Arts Department
Bald Eagle Nittany Area Joint Schools
Mill Hall, Pa.

When the pitch on a circle saw blade becomes too hard to remove unless the blade is soaked in a solvent, try attaching a wire wheel brush to your drill press, grinder, or wood lathe and apply a firm pressure over the pitch covered area. The author has found this method to be faster and less messy than the soak method.

To prevent the brush from grabbing the blade when brushing over the teeth, back up the blade with a piece of scrap lumber.



Removing the resin from circular saw blades

PUTTERING

WILLIAM P. SPENCE
Western Michigan University
Kalamazoo, Mich.

Several years have now passed since course H.I. 101 (Home Improvement and Maintenance 101) was first offered at the Richmond Professional Institute in connection with the Richmond Area University Center, Richmond, Mich., a night college for adults formed by joint faculties of a number of institutions of higher learning in this area. Though the official title is Home Improvement and Maintenance, the course has picked up the nickname, *Puttering*, and is so called by everyone now. The class meets one night a week for 2½ clock hours and is a noncredit course. It is quite a novelty to the people of Richmond, and when it was started it received a fair amount of newspaper publicity. It was even mentioned once by a well-known national radio commentator on his daily program.

The purpose of the course is to help homeowners solve improvement and maintenance problems, to do the work themselves, and to develop a bit of skill with the common tools found in the home. This is an era of *do it yourself* and people seem to thirst for such knowledge. Contrary to the beliefs of many people the classes have never been attended entirely by men. At least 40 per cent of the members are women and they do very nicely.

The course content is determined at the first meeting of a new class. At this time questions are asked of the class to determine the exact problems confronting each individual. The problems that seem to interest the majority are then presented to the class in a series of group discussions with demonstrations. Individual conferences are used to solve problems presented about which the group shows no special interest. Whenever possible the actual articles concerned in the problems are brought into the classroom. Visual aids are used extensively. Most of these must be teacher-made and some require a lot of time to plan and locate the necessary parts.

It is my personal belief that one of the richest experiences derived by the individual class members is the opportunity each has to speak up and tell the entire group about his problem, a solution to a problem he worked out or some experience he has had as a homeowner.

The following is a brief outline of the topics which were covered in the last semester. They were developed from the requests of that one class.

I. Tools
A. Names and uses of common tools

B. How to sharpen tools
II. Fastening Devices
A. Nails
1. Kinds
2. Proper use
B. Screws
1. Kinds
2. Proper use
III. Care of Furniture
A. Cleaning
1. Wood surfaces
2. Cane seats
3. Leather upholstery
4. Fabric upholstery
B. Polishing
C. Leveling rocking pieces
D. Sticking drawers
IV. Refinishing and Repairing Furniture
A. Reworking and patching old finishes
1. Dulled finishes
2. Checked varnish finishes
B. Removing old finish
C. Refinishing wood surfaces
D. Repairing and regluing
V. Plumbing
A. Faucets
1. Kinds
2. Identify important parts
3. Simple repairs
B. Drains
1. Kinds
2. Location in house
3. How to unclog
4. Leaks at threaded connections
C. Toilets
1. How a toilet tank operates
2. Identify important parts
3. Common breakdowns of flushing mechanism and their repair
4. Clogged toilets — cause and repair
5. Toilet seats — repair or replacement
D. Main house sewer line
1. Location
2. How to unclog
VI. Electricity
A. Simple installation operations
1. Boxes
2. Duplex outlets
3. Single toggle switches
4. 3-way switches
5. Light sockets
6. Joining wires
7. Make up an extension cord
8. Wire a lamp
9. Wire an appliance plug
10. Fuses and circuit breakers
B. Read an electric meter
C. Types of indoor wiring available
VII. Floors
A. Creaking floors
1. Causes
2. Remedy
B. Sagging floors
1. Causes
2. Remedy
C. Footings
D. Cracks in floors
1. Causes
2. Repairs
E. Finishing floors
1. Varnish
2. Shellac
3. Paint
4. Oil
F. Refinishing floors
1. Laying new wood floor over old floor
2. Laying composition tile floor over old floor
3. Sanding old floor
VIII. Damp Basement
A. Requirements for a properly built basement
B. Drying a basement
1. Causes of wettness
2. Simple remedies
a) Fans
b) Grading yard
c) Calcium chloride
d) Control downspout discharge
e) Repairing cracks in wall
f) Waterproof paint
C. Waterproofing from outside
IX. Exterior Walls Above Grade
A. Frame
1. Repairs
2. Waterproofing
B. Brick
1. Repairs
2. Waterproofing
C. Efflorescence
1. Cause
2. Remedy
X. Windows
A. Names of parts
B. Cut glass
C. Replace broken glass
D. Freeing sticking windows
E. Replacing sash cords and weights
F. Painting sash
XI. Screens
A. Kinds of wire available
B. Kinds of frames available
C. Replace old wire
XII. Walks and Paths
A. Flagstone paths
B. Concrete flagstones
C. Log walks
D. Concrete sidewalk
E. Brick walk
XIII. Painting and Finishing
A. Prepare interior wood surfaces
B. Finishing materials
1. Stains
2. Fillers
3. Transparent finishes
4. Enamels
5. Paints
C. Prepare interior walls
D. Prepare exterior frame walls
E. What to do if paint peels
XIV. Paint Brushes
A. Types of brushes
B. How to break in a new brush
C. Care of brushes
D. Storing brushes
E. Solvents for various finishes
XV. Termites
A. Classes of termites
B. How termites live
C. How to determine if infested
D. Eliminating the pests
XVI. Things to Investigate Before Buying a House
A. Location
B. Overhaul house in general
C. Basement
D. Foundations
E. Joists and sills
F. Heating plant
G. Floors and stairs
H. Walls and ceilings
I. Windows and doors
J. Hardware
K. Plumbing
L. Hot water heater
M. Sewerage
N. Electrical system
O. Roof
P. Exterior walls and trim
Q. Homeowner liability

A FIELD TRIP IN THE SCHOOL

ANTHONY F. DeSCIPIO

Instructor, 8th Grade Industrial Arts

Elementary Electricity

East Junior High School

Binghamton, N. Y.

If you teach elementary electricity and have been trying to find a method to integrate your classwork and lessons in order to apply the principles studied, you may want to try the idea described here.

Most industrial-arts teachers know the value received by taking a class on a field trip, but sometimes making plans and arrangements as well as providing transportation, getting parents' permission, clearing with school officials, etc., can be a trying situation and often discourages field trips and consequently the loss of their additional educational values. If you are confronted by this common barrier, you may very well want to give this *in school field trip* a try. All you have to do is to take your class during class time on a trip to visit the various areas of the school that house the electrical devices. The time alloted for the trip varies, ranging from about 15–30 minutes. This allows flexibility in your trip.

At the end of the term the boys of the 8A electrical shop are conducted on a tour of the school plant to examine and inspect the various electrical devices and units which are used to help keep the school in operation.

The class as part of its regular work has had lessons on the principles and uses of many of these devices and thus this tour provides the opportunity to see the devices in actual operation.

The tour takes an informal atmosphere with the teacher acting as the guide and making use of services of the custodians to explain some of the units.

The boys begin the tour by going outside of the school building to observe the location and size of the transformers and the wires attached to it. The wires are traced until they go underground near the base of the pole.

The next stop is the service entrance room where the wires are seen to emerge from the ground. The wires are connected to the master fuse boxes where various types of fuses and switches are noted. We stop to visualize the wires leaving the fuse box and emerging into the fuse box which is located in the electrical shop. The opportunity lends itself well to review the uses and purposes of fuses.

Then the special fuse boxes that control the electricity for the electric drier, and electric range of the homemaking department, and also several others are studied. One of these boxes controls the electrical supply which operates the motors and devices in the boiler room. In this service room are located two kilowatt hour meters which the students inspect and are taught to read.

In our school we have several devices that use direct current and as we get a.c. current from the electric company, we have to convert a.c. to d.c. In class discussion when we studied a.c. and d.c. current, we figured out how to produce d.c. when we got a.c. from the electric

Fig. 1. Boys of the 8A electric shop class starting out on the in-school field trip

Fig. 2. Students examining the fuse box and switches located in the corridor

Fig. 3. Examining electrical devices and fuse boxes in the boiler room

Fig. 4. The independent dial telephone system

Fig. 5. A unit that converts a.c., to d.c. current

Fig. 6. Boys on an in-school field trip examining a fuse box, fuses and knife-blade switches

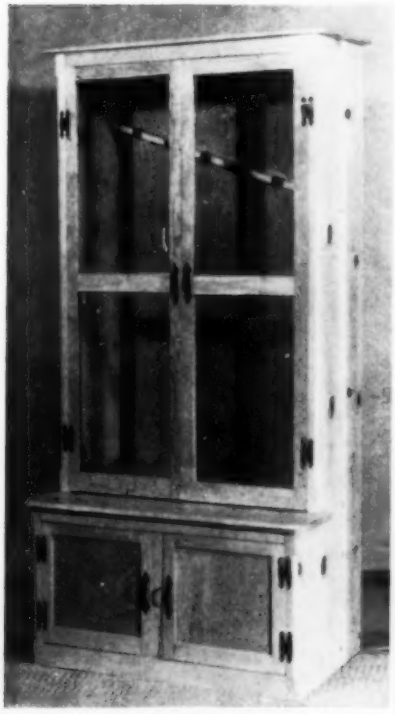
company. The class concluded that an a.c. motor turning a d.c. generator could do this. Then we see the actual operation of such a device here.

Our building has its own independent dial telephone system that is used for room to room calls. While here, we observe the operation of this unit and also a rheostat, a voltmeter, and an ammeter.

We terminate our visit in the service entrance, by tracing wires from the boiler room fuse box to the boiler room and see the wires fastened in a large panel that contains fuse boxes, switches, time clock, relays, and electric eyes. The boys stop to observe the motors on the oil burner and the various electrical devices necessary for operating the oil burners. Returning to our classroom we stop to look at the fuse boxes which are located in the corridors.

After the tour, a follow-up review is highly beneficial in order to answer questions, and to co-ordinate classroom instruction with application of principles of electricity and devices.

It has been felt that the 15–30 minutes used for this trip have been highly beneficial and meaningful for the students because, not only have they studied these electrical devices, but they also have had the opportunity to see them in actual operation.



Gun cabinet submitted by Louis Barocci, High School, Cudahy, Wis.

ARCHED CANDLEHOLDERS

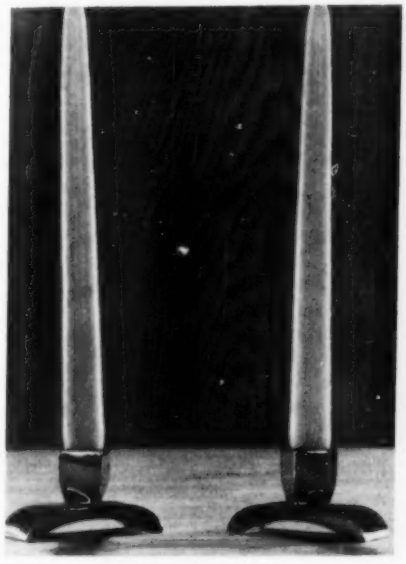
ELMER B. MATTSON
Industrial Arts Department
Hoover Elementary School
Redwood City, Calif.

A minimum of metal produces this simple, yet attractive candleholder. The base is made of $\frac{5}{8}$ by $1\frac{1}{4}$-in. brass stock. Sketch in the shape of the base and cut to proper size with the band saw. File and blend arcs into graceful curves.

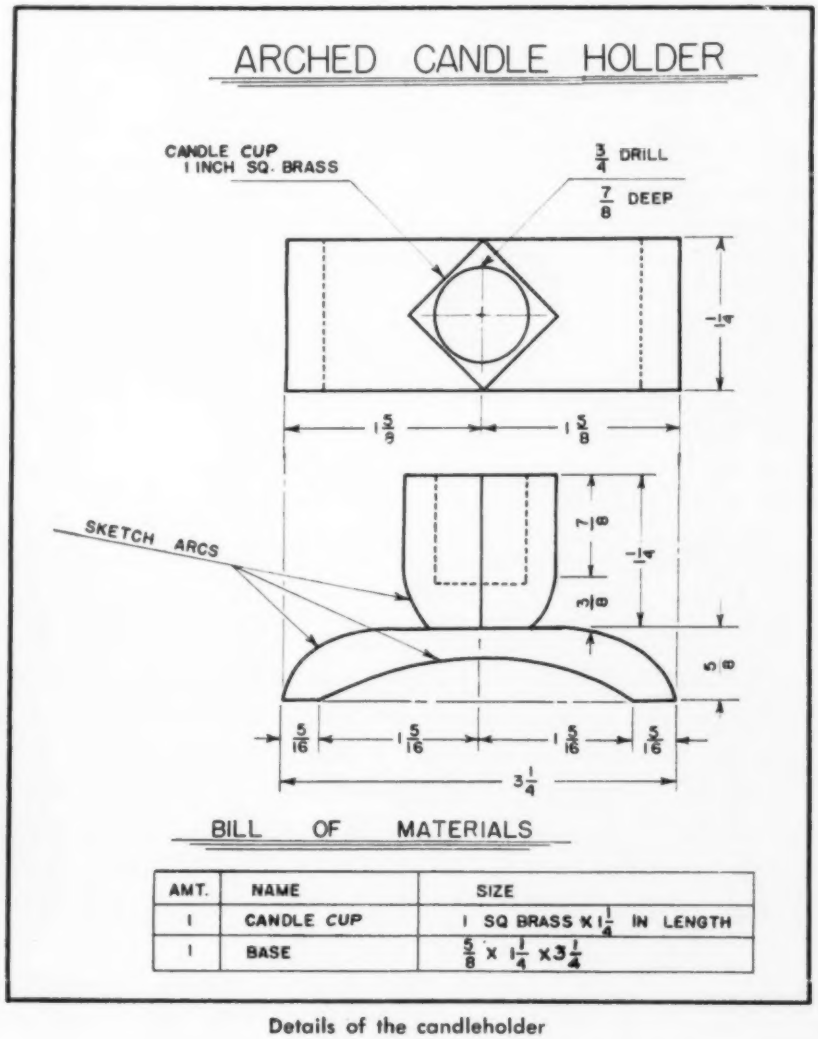
Candle cup is made of 1-in. square brass stock. Drill hole for the candle with a $\frac{3}{4}$-in. drill, $\frac{7}{8}$ in. deep. Sketch in the arcs on all four sides. Partial shaping can be done with the band saw. Then file and blend arcs into attractive and graceful curves.

Attach the holder to the base using one of several methods: (*a*) welding; (*b*) silver soldering; (*c*) use of threads.

After scratches and mars are removed buff it to a beautiful finish. The finish can be preserved by spraying with lacquer.



Arched candleholders


ARCHED CANDLE HOLDER
CANDLE CUP
1 INCH SQ. BRASS
3/4 DRILL
7/8 DEEP
SKETCH ARCS
BILL OF MATERIALS
AMT. | NAME | SIZE
1 | CANDLE CUP | 1 SQ BRASS X 1 1/4 IN LENGTH
1 | BASE | 5/8 X 1 1/4 X 3 1/4

Details of the candleholder

GRINDING THE PLANE IRON

DEAN SAUNDERS
Eastern Michigan College
Ypsilanti, Mich.

In order to do a neat and accurate job of grinding the plane iron a jig should be used. To do this job the plane iron cap may be used as a jig.

The plane iron cap is removed from the top of the plane iron and put on the underside of the plane iron at right angle to the blade — inserting the cap screw in the lateral adjustment slot of the plane iron. Before the grinder is started, the plane iron is placed on the tool rest with the cutting edge against the grinding wheel so the blade will be ground on a 28-degree bevel or twice the thickness of the plane iron. The plane iron cap is then brought up to the bottom edge of the tool rest and the cap screw is tightened. The plane iron cap should be at a 90-degree angle to the blade so that the blade will be ground square. The cap should point away from the grinder motor so it will not strike the motor and interfere with the grinding of the plane iron.

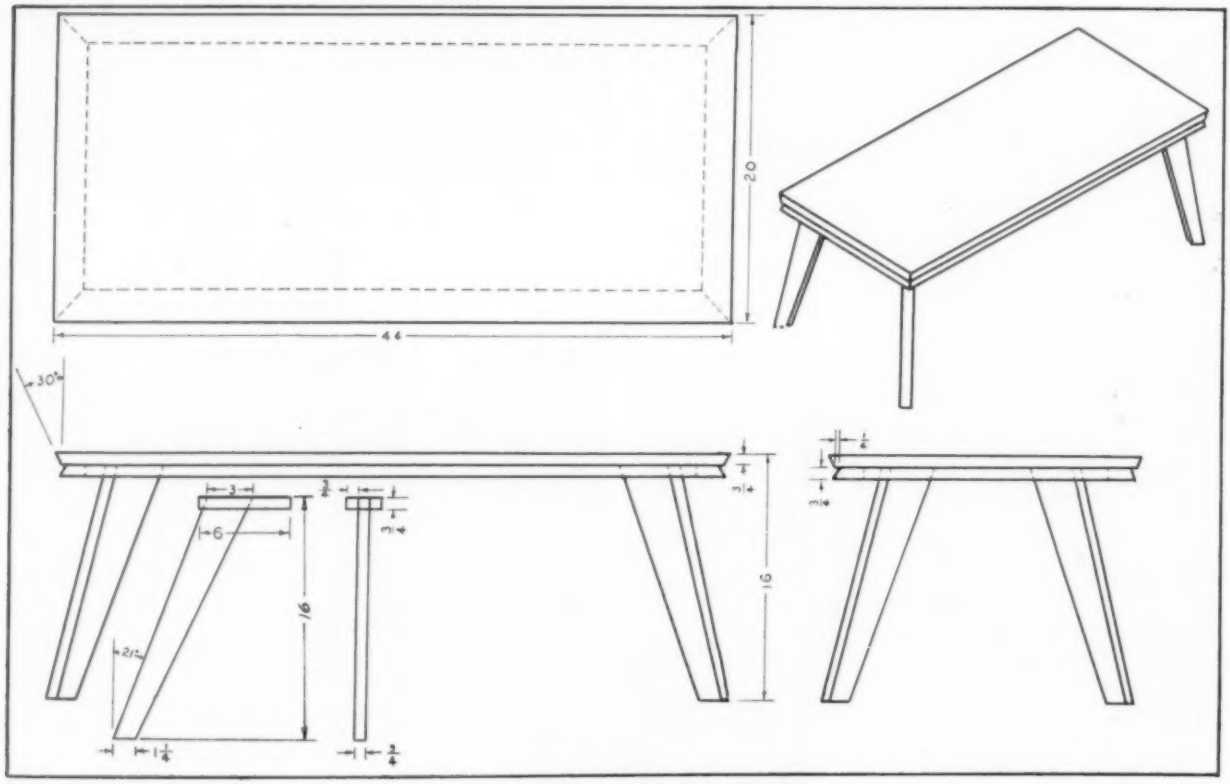
The plane iron can then be ground by traversing the blade across the face of the grinding wheel keeping the plane iron cap up against the tool rest.

Grinding the plane iron

END TABLE

EDWARD J. KANDARE
Industrial Arts Instructor
Memorial High School
Madison, Ohio

The coffee table illustrated and described herewith, is popular with students making their first power woodworking machine project. If you will notice the bottom piece of the top is set in ¼ in. which makes perfect accuracy unnecessary. To simplify the miter joint, the inside of the joint can be lightly sanded on the disk sander. This will assure a tight fit on the outside corner.



Details of the coffee table or end table

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News Notes

FOUNDRY INSTRUCTORS' SEMINAR

The Third Annual Instructors' Seminar, which is sponsored by the American Foundrymen's Society, will be held at Case Institute of Technology, Cleveland, Ohio, June 19–21. At this three-day meeting, instructors in Foundry and Patternmaking will have an opportunity to exchange ideas with foundry leaders and faculty in a concentrated program featuring nationally known speakers, interest workshops, field trips, illustrated lectures, and teaching aids.

The American Foundrymen's Society extends this invitation to foundry and patternmaking teachers in high schools and vocational schools or secondary school teachers contemplating establishing these areas in their programs.

All seminar expenses, including rooms and meals, but excluding transportation to and from Cleveland, will be assumed by AFS.

Registration forms and details should be immediately requested from *R. E. Betterley, education director, American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill.*

NEW SAFETY PUBLICATIONS

The National Safety Council has released two new publications — a 36-page home emergency booklet and an eight-page vacation safety pamphlet.

The home reference booklet, "What to Do about Home Injuries," covers the treatment and prevention of everything from animal bites to nosebleeds. It provides a list of articles to keep on hand for emergency treatment of home accidents, and a directory page for listing emergency phone numbers.

Contents of the booklet have been approved by the American Medical Association and the American National Red Cross.

The vacation safety pamphlet, "Have Fun," shows how vacations can be safe as well as fun. This pamphlet gives pointers on subjects ranging from sightseeing to sports.

Further information and prices may be obtained from the *National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.*

MERGER OF TWO GREAT INSTITUTIONS

Bryant and Stratton College and LaSalle Extension University have announced the merger of these two institutions which have served Chicago so long and so well.

LaSalle Extension University was founded in 1908. It is one of the leading Home Study Schools in the country, and their Certified Public Accountant Training is famous nationally, as well as in the city of Chicago where LaSalle holds residence classes for those preparing for the Uniform Certified Public Accountant Examination prepared by the American Institute of Certified Public Accountants. LaSalle alumni are found in all parts of this country and Canada. Nearly 5000 LaSalle alumni have passed state examinations for Certified Public Accountants.

Bryant and Stratton College celebrated the 100th Anniversary of its founding in 1856 with a dinner at the Chicago University Club on October 10, 1956, given for representatives of the Chicago high schools which were likewise celebrating their 100th anniversary. Bryant and Stratton College is now entering its 102nd year, and has belonged to the same family for four generations. The College has more than 200,000 alumni.

Bryant and Stratton College has served continuously through the troubled times of the Chicago Fire, the Civil War, the Mexican War, the Spanish American War, World Wars I and II, the Korean War, and the many panics since 1856.

The merger with the distinguished, nationally famous LaSalle Extension University will enhance the prestige of Bryant & Stratton College and insure wider opportunity for service in the field of Adult Business Training.

TILE INDUSTRY STEPS UP COLLEGE STUDENTS' AID

Aid to architectural education from the ceramic tile industry has been stepped up this year with the addition of five more colleges to the industry's student scholarship program.

Richard B. Alexander, president of the Tile Council of America, said the group is now supporting $500 architectural scholarships at 12 different institutions.

The five new schools are Carnegie Institute of Technology, Pratt Institute, University of Southern California, University of Texas, and the University of Utah.

Participating for the past two years have been Georgia Institute of Technology, Iowa State College, Ohio State University, Princeton University, Syracuse University, Virginia Polytechnic Institute, and University of Washington.

Attached to each annual $500 scholarship is a stipend of $250 to be used by the school of architecture in improving teaching facilities in courses on building materials.

SECOND FOREIGN STUDENTS PHOTO CONTEST

The Photographic Committee of the People-To-People Program have announced the winners in the Second Foreign Students Photo Contest. This first prize of $500 went to Tibor Ardai, a refugee student from Hungary who is attending New York University. The 20 cash prizes totaled $1,575 and each entrant whose picture was accepted by the judges for the exhibition also received a one year's subscription to *Life, Reader's Digest, Popular Photography,* and *U. S. Camera.*

The 93 photographs accepted by the judges were made by 61 foreign nationals from 37 countries attending 46 schools and universities in the United States. Some are regular students and others are studying here under one of the many exchange programs which operate in universities, high schools, farming, and manufacturing organizations through various associations.

The contest, open only to foreign nationals studying in the U. S. A., was aimed at having our young foreign visitors produce a "Portrait of America." The entrants were asked to photograph whatever impressed them most in the United States and to add a caption explaining why this particular subject seemed important to them in showing how America lives.

The contest is part of the work of the Photographic Committee to further the objective of world peace through better understanding between peoples as outlined by President Eisenhower when he urged the setting up of the People-To-People Program.

ONE WEEK WELDING COURSE

The Lincoln Electric Company will again conduct a special one-week welding course for vocational agriculture and industrial arts teachers. The course, highly successful in past years, concentrates into an intensive five days of study and practice, both instruction in welding and discussions of the best techniques for teaching it. The course is for teachers who do not know how to weld and have not taught it, as well as for teachers with experience in the subject.

The course will be run twice, giving teachers a choice of weeks — the week of July 7–11 and the week of July 14–18. The fee for the course is $25, which covers books, supplies, and luncheons. Transportation and lodgings are not included.

Further details are available from *A. W. Sawyer, The Lincoln Electric Company, 22801 St. Clair Ave., Cleveland 17, Ohio.*

NEW FILM

"The Constitution and Employment Standards" is a documentary film showing the constitution in action. It is a 28-minute, 16mm. sound, black and white motion picture, produced by The Center for Mass Communication of Columbia University Press for the Educational Television and Radio Center. It is distributed by NET Film Service, Audio-Visual Center, Indiana University, Bloomington, Ind.

This documentary film recreates the case of *United States* v. *Darby Lumber Company,* which sustained the wage-and-hour provision of the Fair Labor Standards Act of 1938, and uses the actual locations and persons involved.

The film emphasizes constitutional standards and their shifting interpretation used by the Supreme Court in judging the constitutionality of labor legislation. A review of the legal, social, and economic background of the Fair Labor Standards Act aids in understanding the role of Supreme Court decision making in our governmental system.

The mature approach of the film makes it suitable for high school, college, and adult groups.

NEW BUILDING DEDICATED

A new $1,350,000 electrical engineering and physics classroom building at Illinois Institute of Technology, Chicago, was dedicated on Monday, April 7, 1958.

The building is named Siegel Hall in honor of the late David T. Siegel, trustee of Illinois Tech, and president and founder of the Ohmite Manufacturing Company, Skokie, Ill.

Siegel Hall, at 3301 S. Dearborn Street, will house electrical engineering and physics classrooms, offices, departmental libraries, and a 346-person capacity auditorium. It is the 22nd new building to be constructed at IIT since 1940 when Lewis Institute and Armour Institute of Technology were merged to create Illinois Tech.

Siegel Hall also contains high voltage spectroscopy, solid state physics, and light laboratories, and a machine shop. Other physics and electrical engineering laboratories are incorporated in the building, as well as space for an analog computer and IIT's A-C network calculator.

Construction on Siegel Hall was started June 11, 1956. The structure was designed by Ludwig Mies van der Rohe, director of IIT's department of architecture, who collaborated in the execution of the over-all plan for Technology Center, the name given to the IIT campus. Pace Associates are associate architects.

Mr. Siegel presented Illinois Tech with the initial donation for a new electrical engineering-physics building at Technology Center before his death in March, 1957.

CONFERENCES AND INSTITUTES TO BE HELD

The University of Michigan, Ann Arbor has announced their schedule of conferences and institutes for teachers of vocational edu-

(Continued on page 16A)

MODEL 1000-C. 4-POSITION WOODWORKING BENCH WITH CABINET BASE AND SHOPTOP. Top is 64 x 54 x 2¼ in. Two-position model has top measuring 64 x 30 x 2¼ in. or 64 x 24 x 2¼ in.

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MODEL 1042. ELECTRICAL BENCH WITH TESTING PANEL, WIREMOLD STRIP AND SHOPTOP. Top: 60x24, 72x24, 60x30, 72x30x1½ in. Other thicknesses optional.

MODEL 1021. STAKE BENCH WITH PIPE RACK, SHELF, STAKE PLATES AND SHOPTOP. Top is 60x42x2¼ in., 72x42x2¼ in. or 96x42x2¼ in. Stake plates 30x8 in.

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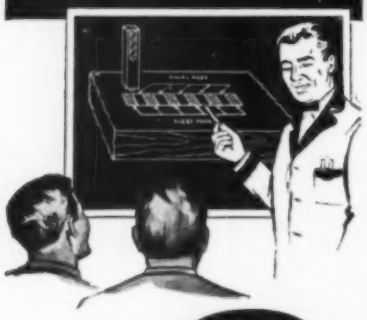

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NEWS NOTES

(Continued from page 14A)

cation and practical arts subjects to be held during the school year 1958–59.

A number of different units in the University are co-operating in the planning of the conferences. Included are the Extension Service, Department of Wood Technology in the School of Natural Resources, Departments of Engineering Drawing and Mechanical Engineering in the College of Engineering, the Department of Vocational Education and Practical Arts, and the University School in the School of Education.

The following list includes dates:

Sixth Annual Institute for Teachers of Woodwork — November 22, 1958;

Sixth Annual Institute for General Shop Teachers — January 10, 1959;

Sixth Annual Institute for Teachers of Auto Mechanics and Seventh Annual Conference for Teachers in Driver Education — March 14, 1959;

Seventh Annual Institute for Drafting Teachers and Seventh Annual Institute for Machine Shop Teachers — March 28, 1959.

NONDESTRUCTIVE TESTING SYMBOLS

The American Welding Society has recently announced the issuance of a new publication (AWS A2.2–58) setting up symbols to be used for specifying nondestructive tests.

This standard supplies a long-felt need. For the first time it is possible to specify in a single symbol the type of test required: (1) Radiographic; (2) Magnetic-Particle; (3) Penetrants; (4) Ultrasonic.

Furthermore, nondestructive testing symbols can be combined with welding symbols. Time and labor can be saved by giving complete welding and testing instructions in one symbol.

Nondestructive Testing Symbols can be obtained at $1 per copy from the *American Welding Society, 33 West 39th Street, New York 18, N. Y.*

♦ Screw-Thread Standards for Federal Services, 1957, National Bureau of Standards Handbook H28 (1957) — Part I, amends in part H28 (1944) (and in part its 1950 Supplement), issued September 10, 1957, 214 pages, $1.25. Order from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

This publication represents the work of the Interdepartmental Screw Thread Committee, which is sponsored by the Departments of Defense, Army, Navy, Air Force, and Commerce, to promote uniformity in screw-thread standards in the Department concerned. The handbook is based on the 1933 and earlier reports of the National Screw Thread Commission and NBS Handbooks H25 (1939) and H28 (1942 and 1944), together with pertinent standards approved and promulgated by the American Standards Association.

The current work is to be issued in three volumes or parts; this volume, Part I, supersedes sections I, II, III, IV, V, XV, and XVI, and Appendices 1, 2, 6, and 8 of Handbook H28 (1944). Sections XI, XII, XIII, XIV, and XVII and Appendix 7 of H28 (1944) are superseded by Federal Specifications listed in Appendix 6. The other sections as published will remain available until Parts II and III of the Handbook are issued. Part II will include standards for hose-coupling, pipe, and gas cylinder threads and will be issued when the revised standards have been completely formulated. This will be followed by Part III, which will include Acme, Sub-Acme, Buttress, and miscellaneous standard threads.

RESEARCH REPORT

You read about the AMERICAN TECHNICAL SOCIETY Research Awards Program in the February issue of *Industrial Arts and Vocational Education.*[1]

Now you can procure your own copy[2] of the study that won First Award!

It's John a Fuzak's[3] five year study into methods of determining students' readiness for training in manipulative skills.[4]

Industrial educators will find Fuzak's *Research Report,* which has been reproduced in the exact form in which it was submitted to the Program, to be a valuable tool for the following purposes:

(a) As a guide to the formal organization and presentation of research findings.

(b) As a study in the effective use of modern research methods in industrial education.

(c) As an exhaustive analysis of a concrete educational problem, and a substantive contribution to its solution.

On approval copies[5] may be obtained by using the coupon below, or by simply writing Dept. W333, American Technical Society.

[1] Industrial Arts and Vocational Education, (February, 1958), p. 25A.

[2] Published by *American Technical Society* as a service to industrial education.

[3] Professor of Industrial Education, Michigan State University; President, American Industrial Arts Association.

[4] Formally entitled *The Role of Physical Maturation in Determining the Ability of Junior High School Boys to Perform Complex Finger Coordinative Activities and an Index to Level of Ability.*

[5] List price tentatively set at $1.50.

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♦ The United States Department of Labor's 1957 edition of *Occupational Outlook Handbook* is being made available in the form of 65 separately bound reprints covering each of the various fields of work. These reprints are of special value to persons and organizations interested in particular occupations or industries.

♦ The Fifth Annual Institute for Teachers of Auto Mechanics and the Sixth Annual Institute for Teachers in Driver Education was held at the University of Michigan on Saturday, March 15, 1958.

Auditorium A, Angell Hall was headquarters for the morning sessions. The afternoon sessions on Automotive Engineering Laboratories were held at North Campus.

The Institute is sponsored by the Department of Vocational Education and Practical Arts of the School of Education, the Department of Mechanical Engineering, and the University Extension Service.

Cooperating organizations: Chrysler Corporation, Ford Motor Company, General Motors Corporation, Department of Public Instruction, Automobile Club of Michigan, and the Michigan Driver and Safety Education Association.

♦ A 112-page handbook entitled "Industrial Arts for Georgia Schools" was completed in January, 1958. Similar to industrial arts bulletins published in other states, this handbook attempts to establish a framework for the program in Georgia.

In addition to a statement of the philosophy and objectives of industrial arts in Georgia, it provides a discussion of the program, course content, methods and techniques of instruction, evaluation, shop planning and equipping, public relations, the selection of texts, and several other topics of concern to industrial arts teachers and school administrators.

The publication is the result of the combined efforts of the Georgia Industrial Arts Association and the Vocational Education Division of the State Department of Education.

♦ The University of Houston, Houston, Tex., has just published a two-color illustrated folder describing its training program in the field of the broadcast arts.

Featuring modern artistic layout, the folder includes photographs in the radio, television, and film studios. Reference is made to the large number of courses in the broadcast field currently in the University of Houston curriculum.

The University of Houston is the location of the nation's first noncommercial educational television station, KUHT, Channel 8, Houston. Also located on campus is a noncommercial educational FM Radio Station, KUHF. Both stations are mainly student-operated.

Students contemplating careers in broadcasting, including those now studying at other universities or trade schools, may receive a free copy by writing to the *Radio-Television-Film Center, University of Houston, Houston 4, Tex.*

♦ The Audio-Visual Center, Department of the Library of the City College of New York announces its new catalog of films available for rental. Entitled See . . . Hear . . . Mr. Businessman, 1958–59, this catalog is available free of charge.

It is a 53-page classified-by-subject list of films, and filmstrips dealing with business topics. The catalog includes instructions for booking these films, and also service regulations.

To obtain a copy of the catalog, write to *The City College, Bernard M. Baruch School of Business and Public Administration, 17 Lexington Ave., New York 10, N. Y.*

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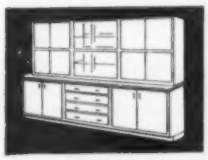

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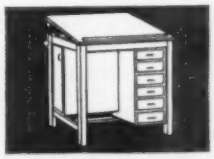

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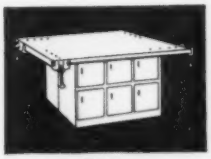

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New Publications

REPORT OF THE 42ND NATIONAL CONFERENCE ON WEIGHTS AND MEASURES 1957

National Bureau of Standards Miscellaneous Publication 222, issued December 20, 1957, 133 pp., 55 cents. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

This report records the proceedings of an annual conference sponsored by the National Bureau of Standards, June 4–7, 1957. It includes the conferees' papers delivered during this four-day meeting. In addition, there is full documentation of the conference transactions, comprising comprehensive lists of the officers, the constituent committees, and the conference enrollment. Also included are the introductory addresses and forum remarks.

You Can Give Orders That Get Action

By Joseph D. Birch. Paper, 22 pp., 4⅝ by 6⅝ in., illus., 25 cents. National Foremen's Institute, New London, Conn.

This well-illustrated booklet offers fine suggestions to supervisors who have to give orders to plant or factory employees. The down-to-earth points of interest expounded in the booklet are based on these four simple rules: (*a*) make the order clear and complete; (*b*) make it for the person; (*c*) make it businesslike; (*d*) make it easy to take.

Other items helpful to supervisory personnel will also be found in this booklet.

How You Can Search for Science Talent

Science Clubs of America. Administered by Science Service, Washington, D. C. Paper, 22 pp., 5¼ by 8 in., illus.

A book of facts about the 17th annual science talent search for Westinghouse science scholarships.

Guidance Workers — Certification Requirements

By Royce E. Brewster, Specialist for Guidance Practices, U. S. Department of Health, Education, and Welfare, United States Government Printing Office, Division of Public Documents, Washington 25, D. C.

The Mechanics of Inflation

By Harry A. Bullis, Chairman, Committee on Economic Policy, Economic Research Department, Chamber of Commerce of the United States, Washington 6, D. C. Paper, 70 pp., 5⅞ by 8⅞ in., illus., $1; single copy; 75 cents, 2 to 24 copies; 50 cents, 25 or more copies.

Panic and Its Control

By Walter Cutter, Center for Safety Education, New York University, Accident Prevention Department, Association of Casualty and Surety Co., 60 John St., New York 38, N. Y.

The United States National Museum Annual Report

This annual report made by the director of the United States National Museum shows what this interesting institution accomplished with their investigations and research in anthropology, zoology, botany, geology, engineering and industries, and history for the fiscal year.

Related Information on Plumbing I

By Harry Slater. Paper, loose-leaf, 198 pp., 7⅞ by 10¼ in., illus., $2.75. Delmar Publishers, Inc., Albany, N. Y.

Public health is closely tied up with plumbing, hence related technical information of the type of material contained in this book is sorely needed.

The author who taught the subject has made a very good job of this text.

In section I he treats of pipe and fittings. Section II presents the related information on cast iron soil pipe. Section III is on the cold water supply. Section IV explains the drainage systems. Section V, the hot water supply, and Section VI describes the plumbing fixtures in general.

Mathematics for Plumbers and Pipefitters

By Bartholomew D'Arcangelo, Benedict D'Arcangelo, and J. Russell Guest. Paper, looseleaf, 185 pp., 7¾ by 10¼ in., illus., $2.75. Delmar Publishers, Inc., Albany, N. Y.

This book was prepared to furnish apprentices and journeymen of the pipefitting trade the specialized mathematics which they need.

Part I of the book reviews the fundamentals of arithmetic.

Part II shows how length calculations are made.

Part III explains the arithmetic used when the plumber does lead work.

Part IV is devoted to volumetric problems.

Part V shows how to figure heat losses of a room, and the radiator and pipe sizes required for problems in heating.

(Continued on page 20A)

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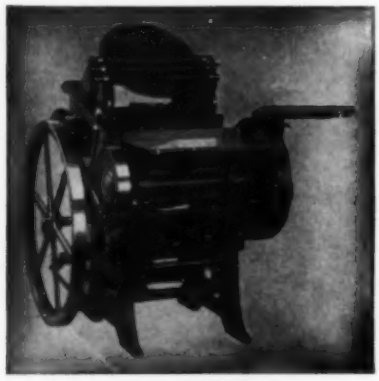

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Whatever your needs may be—whether it's a single unit addition or a complete workshop, it will pay you to compare Duro before you buy. When you analyze Duro Power Tool features, sizes, specifications and operating advantages, with any of the other leading brands on the market—you will quickly see why Duro offers more for your money!

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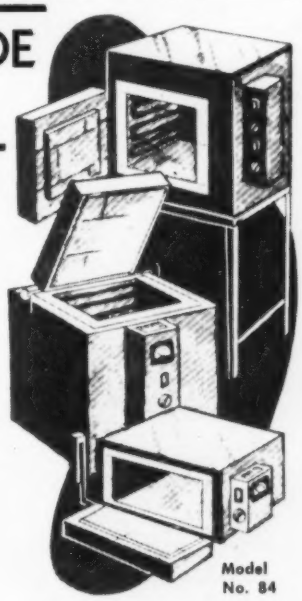

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NEW PUBLICATIONS

(Continued from page 18A)

The appendix contains tables of square roots, sizes of standard pipe parts (elbows, T's, Y's with 45- and 90-deg. fitting angles), constants for 45-deg., 60-deg., 22½-deg., and 11¼-deg. fittings. Also for ⅜, ¼, and ⅛ and 1/16 bends. Also data for single and double Y branches, single and double sanitary T branches, single and double tapped-T branches, and slip and calk type drainage fittings. Also dimensions and capacities for pipe and constants for parallel offsets.

Clay and Glazes for the Potter

By Daniel Rhodes. Cloth, 219 pp., 7⅜ by 10½ in., illus., $7.50. Greenberg, Publisher, New York, N. Y.

This book treats of an art that is centuries old and describes and illustrates it well. It is a book for the beginner, student, teacher, potter, and collector, or for that matter, for anyone interested in the materials used by the potter.

Twenty-three of the 30 chapters in the book are devoted to the subject of glazes. All of the subject matter is explained very well and most of the illustrations are superb.

Part one contains seven chapters which explain all about the various kinds of clay, their chemical composition, physical nature, drying and firing, mining and preparing of clay.

Part two is devoted to glazes, early types used, oxides and their function in glaze forming, materials used for glazes, glaze calculations, composition of glazes, types of glazes, organizing glaze formulas, fritted glazes, glaze textures, sources of color in glazes, compounding and blending glazes, glaze mixing and application, firing glazes, glaze flaws, engobes, underglaze colors and decorations, overglaze decoration, reduction firing and reduction glazes, and special glazes and glaze effects.

The appendix presents glaze formulas, a glossary, and a bibliography.

Progress in Peaceful Uses of Atomic Energy, July–December, 1957

Paper, 463 pp., 5 13/16 by 9⅛ in., illus., $1.25. Superintendent of Documents, Government Printing Office, Washington 25, D. C.

This is a three-year summary of what the Atomic Energy Commission has done since 1953.

The book describes the progress made with radioisotopes, power reactors, growth of atomic energy industry, progress in international co-operation, and progress in physical research.

The commission's activities in selected atomic energy programs are also portrayed.

New Lessons in Arc Welding

Cloth, 108 pp., 5⅞ by 8 13/16 in., illus., $1. The Lincoln Electric Co., Cleveland, Ohio.

This is the fourth revision of this excellent text. The methods and material presented in these lessons have been gathered from the Lincoln Arc Welding School, welders in the field, from welding teachers, and from the engineers of the Lincoln Electric Company.

Section I of the book explains the theory and techniques of arc welding. Section II describes the arc welding machines. Sections III, IV, and V show what electrodes should be used for welding mild steel, stainless steel, and for hard surfacing jobs. Section VI does the same service for welding cast iron, nonferrous metals, and also explains where and when to use wash-coated mild steel electrodes.

Section VII presents information on the identification of metals, welding symbols and other supplementary data.

The book presents a total of 79 lessons from which students of arc welding and their teachers can derive great benefits.

Living Your English, Grades 9, 10, 11, 12

By Robert G. Colton, Grace M. Davis, and Evelyn A. Hanshaw. Grade 9 — paper, 200 pp., 8 3/16 by 10⅝ in., illus., $1.40.

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Each book in the series includes eight tests.

This series presents a simple approach to the difficult study of English. The explanatory text and practice material is written up in a clear, understandable style.

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Radioisotopes: New Tool for Industry

By Sidney Jefferson. Cloth, 110 pp., 5 by 7½ in., illus., $4.75. Philosophical Library, New York, N. Y.

This book was written to give the layman an insight into the ways in which industry can make use of radioactive materials. Radioisotopes make it possible, for instance, to cover up pipes or tanks laid in trenches underground, and test them afterward for leaks by a method of radioactivity.

The book is divided into two parts, the first of which describes industrial applications of radioisotopes, and the second explains the elementary fundamentals of radioactivity.

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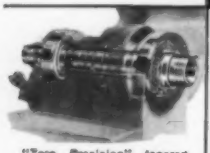

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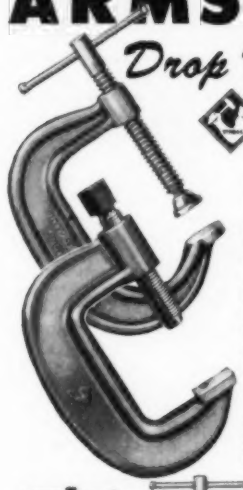

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SHOP EQUIPMENT NEWS

(Continued from page 29A)

Providing many safety features never before offered, the Safety Glide Guard serves to protect during cut off, ripping, dado, and grooving work to various widths and thicknesses. It is never necessary to remove the guard and thus risk injury.

For extra safety, the unit is equipped with the largest and strongest dual "anti-kick backs" ever used on a saw guard. Among the new design features is an adjustable splitter which conveniently adjusts to clear work when not in use.

Tough, breakproof shields of ¼-in. clear plexiglas operate separately or together. Mounted on table, floor, or ceiling, installation is fast and simple, for either tilting table or tilting arbor. Sealed ball bearings require no oiling.

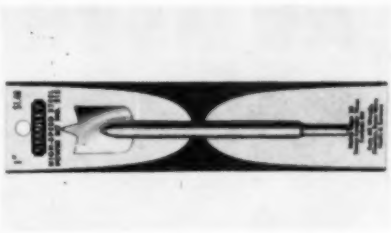
Two models are available, one for commercial use and a lower priced unit designed especially for 6- and 8-in. home workshop saws.

Descriptive literature and prices are available.

(For further details encircle index code 0611)

FAST DRILLING, SUPER-TOUGH STEEL POWER BITS

The Stanley Works have introduced a new series of high-speed, molytungsten power bits. Fast and straight drilling, the bits are made to bore clean holes in wood, plastics, and plywood. These new bits will maintain sharpness of cutting edge even when heated to a point that would ruin an ordinary bit. Chance contact with wire, screw, nail, or plaster will not affect the cutting edge. The over-all length of each is 6¾ in. A power bit extension, No. 212, is also available, adding 12 more inches to your drilling reach.



Super-Tough Steel Power Bit

The new No. 215A steel power bit set, for use in electric drills and drill presses, fits ¼ in. and larger chucks. The six bits come in a handy plastic kit ideal for storage in your drill kit, workshop drawers, or tool box. Sizes are 3/16 in., ½ in., 5/16 in., ¾ in., ⅞ in., and 1 in. Power bits No. 215 may also be purchased individually. Stanley tools are handled only by leading distributors.

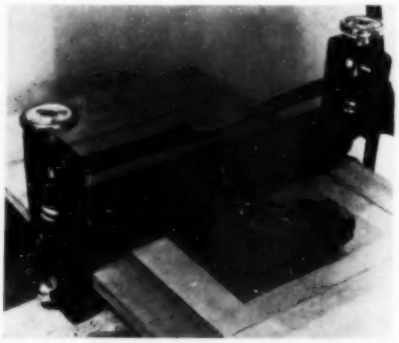
Further information is available upon request.

(For further details encircle index code 0612)

THE LASZLO UNIVERSAL HANDPRESS

Rembrandt Graphic Arts Company, manufacturers of The Laszlo Universal Handpress, announce added improvements on the press and also the enlargement of their supply department.

The wood *spacer strips* are added standard accessories, furnished with the press. They protect the margin of the print paper from possible plate marks and keep the edges of the print clean.



The Laszlo Universal Handpress

The two interchangeable beds, the type-high chase and the flatbed, establish the Laszlo as the only true universal Printmaker's Press. The chase prints blocks and the popular type-high lithographic stones. These stones are manufactured from imported Bavarian limestone. They are slightly under 15/16 in. thick, can be used both sides, come in 10 by 12, 12 by 14, and 12 by 16 sizes, and by grinding with carborundum powder can be used again and again for years. Rembrandt Graphic Arts Company sells these stones and all other supplies only to owners of the Laszlo Press.

The Flatbed is used for the printing of celluloid etching and dry-point plates, metal etching plates and zinc litho plates.

Without any complicated mechanical rearrangement the change of the bed makes the press ready from plate printing to type-high printing.

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Color printing in perfect register is simple and fast on the Laszlo, due to the unique color registering design of the bed. The so-called "offset" printing from the roller is shown in the illustration.

The *Filler* — a standard accessory of the press — makes printing from ⅛ in. thick unmounted linoleum plates, another inexpensive and popular art material, simple both in monochrome or in color.

Free catalog and supply list are available.

The Laszlo Universal Hand Press will be exhibited and demonstrated at the convention of the American Vocational Association in Buffalo, N. Y., at Hotel Statler, August 11 through 14, 1958.

(For further details encircle index code 0613)

NEW MULTI-PURPOSE ART DESK

Smith System Mfg. Company have introduced a new multi-purpose "Top-O-Matic" art desk, the latest addition to their line of specialty steel furniture and equipment for schools, churches, and industry.

"Top-O-Matic" No.400 AD
Art or Commercial Desk

This desk permits using the same room and equipment for both art and commercial training purposes. For art classes or mechanical drawing classes the desk top is set at the desired angle. To lower the top to an intermediate or horizontal position touch the special "Top-O-Matic" button and down floats the top, gently, quietly, safely, and automatically, thanks to a hydraulic restraining device. No noisy banging of tops, and no danger of smashed fingers often resulting from freely hinged tops.

The top is made of "Fiberesin," a warp-proof laminated board with melamine plastic surface that is for all practical purposes, stain-proof, chip-proof, crack-proof, and scratch-proof.

Complete information, including quantity prices, on the new "Top-O-Matic" No. 400 AD Art or Commercial Desk may be obtained by writing.

(For further details encircle index code 0614)

CORRESPONDING CODE INDEX NUMBERS TO BE ENCIRCLED CAN BE FOUND ON THE CARDS IN THE READER'S SERVICE SECTION

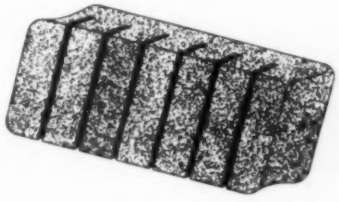
Cavities around a wood knot should be filled with plastic wood. When it sets, sandpaper it down and apply a thinned coat of pure, white shellac.

— *Shellac Information Bureau.*

DRAFTING TIPS

"Do it yourself" pencil cleaner

A block of felt such as an old blackboard eraser with a series of parallel grooves in the face has proved to be very efficient for removing graphite

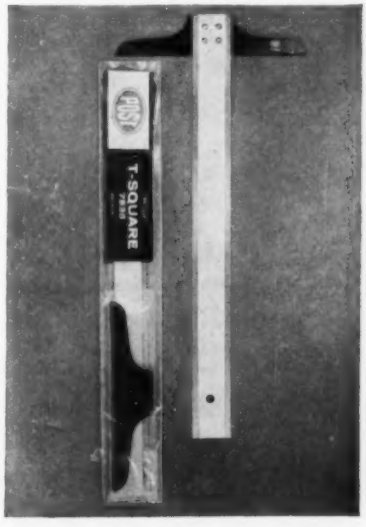


dust from pencil points after sharpening. Pencil point is simply run through one of the grooves after sharpening.

New "TRU-UP" T-SQUARE Eliminates Alignment Problems

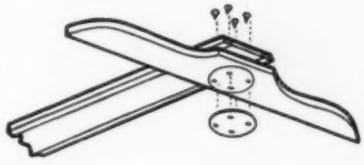
Many of our friends who are industrial arts teachers are particularly enthusiastic in their reception of the latest addition to POST's complete selection of T-Squares.

The new entrant called the "Tru-Up" is basically a high quality 24" maple T-Square Blade with transparent edges. Complete with ebonized head, and key-end construction, it includes the fine finish and precise, quality construction that users have come to expect on any item bearing the "POST" mark.



But, unlike other T-Squares the Tru-Up comes with the head dismounted, in a compact rectangular package about 24½" long. The special patented construction, illustrated in the diagram below, permits the square to be quickly assembled by simply tightening four brass screws.

The handling advantages are obvious. T-Squares become easy to store or to carry to and from class. For both instructor and student the new Tru-Up produces an extra bonus of convenience.



But, even more important, Tru-Up special construction provides protection against rough handling, or even horseplay. If it is knocked out of alignment through abuse, Tru-Up can be readjusted and tightened to perfect squareness.

Tru-Up No. 7838 is so new it is not covered in your existing POST catalog. For complete information on this convenient new drafting tool *write to Educational Sales Division, Frederick Post Company, 3648 North Avondale Ave., Chicago 18, Illinois.*

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Shop Equipment News

BROWN & SHARPE PRODUCTS

In addition to the established lines of Precision Tools, Metal Cutting Tools, Screw Machine Tools and Pumps, Brown & Sharpe will display at ASTE 1958 Tool Show — Booth 824 — the Magnicator Junior, a time-saving line of Magnetic Base Tool combinations. This versatile tool comes in two base sizes, with a variety of accessory dial indicators, lights, and magnifiers to meet multiple inspection and setup needs. The permanent magnet base mounts instantly on flat or round ferrous surfaces.

The new Hite-Icator represents an advance in operating ease and speed over previous height-measuring instruments. The sensitive dial indicator is actuated by the gauge-block

The new Magna Set System Hite-Icator

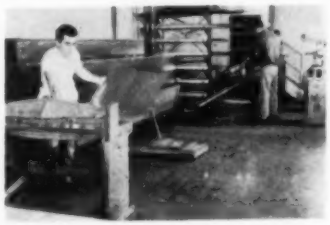
column itself, as it moves up and down over the 1-in. range of the micrometer head. It is therefore easy to position within a thousandth without squinting — the dial is readable from a distance of several feet and makes misreading practically impossible. When the rough position has been established by quickly spinning the micrometer head, finer adjustment brings the height of the measuring surface right down to a tenth, and the exact height can be read to .0001 in., from the fine graduations on the mike thimble.

Riser Blocks are either plain or magnetic. Plain blocks are for use singly with the Hite-Icator and magnetic blocks can be assembled in any number. Riser Block surfaces are chrome-plated and lapped to better than Class A gauge block accuracy per inch: Magnetic blocks hold 10-in. Hite-Icator firmly when switched on, forming a solid column almost impossible to knock over. They are easily disassembled when turned off.

(For further details encircle index code 0601)

WAYNE MOVABLE FOLDING BLEACHER

A novel solution to the problem of group seating and instruction for school shop classes, without loss of floor space, is the Wayne Model 50 rolling gymstand, which is in use at Pennridge High School, Perkasie, Pa.



After the lecture, the Wayne Folding Bleacher is folded against a wall to give space for other operations

Wayne Iron Works furnished and installed the bleacher when Pennridge High School was built three years ago. Since its installation, this seating unit has not given one bit of mechanical trouble.

This Wayne 5-row gymstand is 12 ft. long and when pulled out for seating occupies 144 sq. ft. When pushed back against the wall it covers only 18 sq. ft., a saving of 126 sq. ft. of valuable floor space.

In addition to saving floor space, the Wayne movable bleacher offers several teaching advantages, namely, easier instruction, because the teacher can see all the students he is lecturing to; students have better visibility; teacher has better control of the class; and it eliminates the use of stools, giving the students more room around their workbenches.

It offers also a convenient storage place for sheet metal which is stored on a cart and easily slid under the closed gymstand.

(For further details encircle index code 0602)

SPECIAL CARBIDE TOOLS

Chicago-Latrobe, designers and makers of carbon, high speed, and tungsten carbide twist drills, reamers and special tools, have included also the piloted step core drill shown.

Piloted Step Core Drill

A catalog of a complete line of Carbide Tools is available upon request.

(For further details encircle index code 0603)

PROFESSIONAL TRIANGULAR SCALES

Alvin and Company is now offering a complete selection of professional triangular scales. They are especially designed practical aids to speed the work of architects and engineers. Alvin's triangular scales are constructed of choice, seasoned Genuine Boxwood, manufactured in new and standard designs.

The faces are completely embodied in white plastic for durability and lightness. Engine-divided for sharpness of graduation with divisions that assure perfect accuracy, they feature colored furrows for quick choice of desired scale.

Triangular scales available in popular architects' open divided graduated scales, engineers' fully divided chain scales, and combination architects' and mechanical draftsmen's open and fully divided scales.

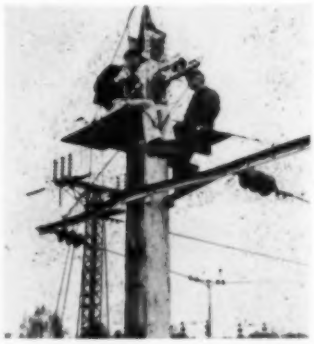
Further information is available.

(For further details encircle index code 0604)

CORRESPONDING CODE INDEX NUMBERS TO BE ENCIRCLED CAN BE FOUND ON THE CARDS IN THE READER'S SERVICE SECTION

BLACK & DECKER MAGNETIC DRILL PRESS

A difficult job which involved drilling approximately 4000 holes in 14-in. wide-flange steel columns at a height of 30–90 feet from the ground was performed recently with the aid of three Black & Decker 1¼-in. Magnetic Drill Presses.



Magnetic Drill Press

The job called for an extension in height on approximately fifty 132 K V transmission poles along the Pennsylvania's West Chester branch railroad tracks, to accommodate installation of the new three-phase electrical system. This required that an additional steel pole up to 70 feet in height had to be attached to the existing poles. The two units had to be bolted together in mid-air with the aid of accurately overlapping holes predrilled in each. To drill connections in the upright poles high off the ground, some of which required as many as 80 holes, was a man-breaking job, even with a conventional portable electric drill. Besides the obvious heavy labor involved in pushing a drill bit through ¾-in. steel dozens of times a day, there was the danger to the operator of having to maneuver the tool while working in a precarious spot high up and close to high-tension wires.

This drilling problem was easily solved with Black & Decker 1¼-in. Magnetic Drill Presses equipped with Black & Decker's exclusive Hydra-Power feed. Release of the trigger made instant magnetic contact again. The drill point locator, also an exclusive feature of the Black & Decker Drill Press, positioned the drill bit for each new hole with pinpoint accuracy.

(For further details encircle index code 0605)

"FINGER TIP" CONTROL MICROMETER

Brown & Sharpe Manufacturing Company are offering their new revolutionary convertible thimble micrometer — friction type — with many features of styling, convenience, and ease of measurement. The convertible thimble permits the micrometer to be used, at will, either as a *friction* or *fixed* type. Used conventionally, the operator depends on sense of feel for measurements, or if he prefers the

(Continued on page 26A)

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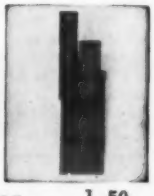

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7. Anvil Base with storage for anvil tools.
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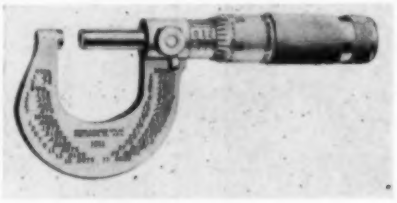
SHOP EQUIPMENT NEWS

(Continued from page 24A)



"Finger Tip" Control Micrometer

slip or friction type, a slight rotation of the nut friction control provides a uniform measuring pressure.

This new revolutionary micrometer with a range of 0 to 1 inch is graduated in ten thousandths of an inch. It is furnished in a plastic case.

For more information write for circular M68, which is available on request.

Convertible Thimble Micrometer users are offered a personalized micrometer at no extra cost. Packed with every micrometer is a self-addressed post card that can be filled out and returned to the manufacturer for a maximum number of three initials. Complete instructions are provided for applying the initials and in a matter of minutes, the micrometer is personalized, removing all chances of mistaken ownership.

(For further details encircle index code 0606)

NEW PROOF-PRESS MODEL

Challenge Machinery Company announces a new proof-press model, the 20 GP, designed both as a "repro" press and as an aid to printers in the pre-makeready and color register proofing of platen and small cylinder press forms.

The new unit, which takes forms up to 19½ by 23½ in., features a type-high bed for accurate "repro" proofing, adjustable micrometer front and side guides for close register proofs, automatic impression trip and gripper release for fast quantity proofing, automatic power inking and numerous other features.

The unit is designed to meet a growing printer's need for a proof press capable of

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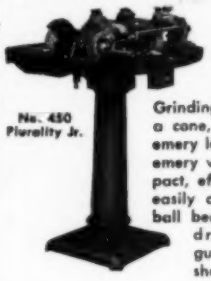

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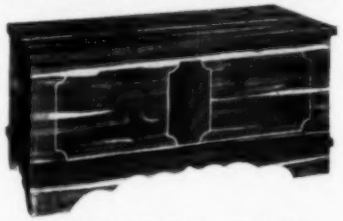

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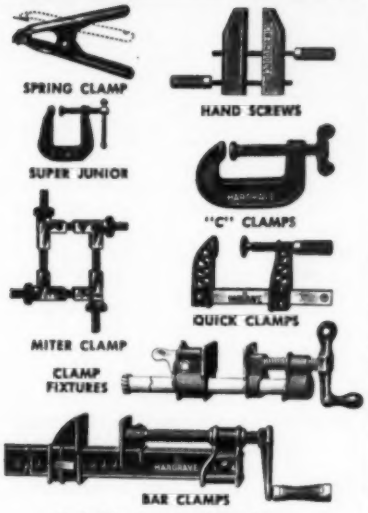

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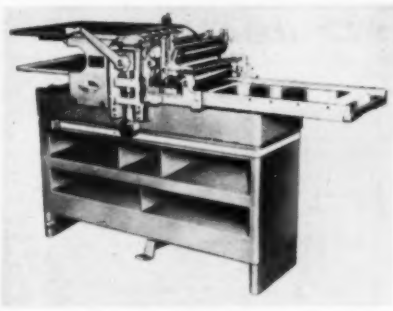

New Proof-Press Model

providing fine "repro" type proofs for offset and engravings with a bed capable of taking small cylinder press forms for pre-make-ready work and color register proofs. This frees the regular presses, saves make-ready time and enables letterpress operations to compete more favorably with offset. Another practical application is the making of duplicator and offset press plates by the direct image proofing of letter press forms.

(For further details encircle index code 0607)

CLARK ADJUSTABLE BORING TOOL

Robert H. Clark Company have introduced the new Clark Boring Tool. Hole sizes produced by this new tool can be rapidly expanded or reduced without removing blades from bar or removing boring bar from the setup. Blades are expanded by a tapered socket head screw adjusted from the bar end. One full rotation expands cutters .020 in., on the hole diameter, making possible sensitive adjustments. Both blades are supported by V tongues riding in V grooves which maintain alignment of blade edges. Once set, blades are locked in fixed position by twin set screws. Multiple blade sizes fit each bar size, expanding over-all range.

Clark Adjustable Boring Tool

Due to its rigidity, the Clark Adjustable Boring Tool is not limited to finishing, but is capable of heavy cuts for roughing operations. The M-3 H.S.S. cutters, superior for machining all metals, are specially efficient on stainless and tough heat-treated alloy steels as well as abrasive subjects, such as cast-iron and aluminum.

Standard bar sizes cover 1¼ to 4½-in. hole diameters. Other sizes are available on request.

Literature on this tool is available.

(For further details encircle index code 0608)

NEW SCHOOL BENCH TOP

The Columbia-Hallowell division of Standard Pressed Steel Company, is offering a solid wood-core bench top with a durable composition facing that provides a superior work

(Continued on next page)

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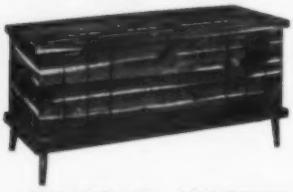

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SHOP EQUIPMENT NEWS

(Continued from previous page)

New School Bench Top

surface for school shop use. Called Shop Top, it is an optional work surface on its complete line of Hallowell school shop furniture, including woodworking, machine, stake, and wall benches.

The new tops can also be purchased separately for replacement of existing work surfaces.

Hallowell Shop Tops, used in industry for a number of years, have a smooth, tough Resinwood composition surface ideal for all kinds of school shop work.

Shop Top has a core made of selected kiln-dried wood blocks, bonded under pressure and heat for durability and freedom from warping. It is faced with ¼ in., or ⅛ in. Resinwood, a composition of uniform particles of kiln-dried wood and natural resins bonded under heat and pressure into a homogeneous material of extreme density and even texture. Its smooth surface is virtually wearproof. It resists acids, alkalis, oils, and greases. A natural wood color heightens work visibility and lasts indefinitely without darkening or discoloration.

Additional information on sizes and prices is obtainable.

(For further details encircle index code 0609)

NEW HIGH SPEED TURRET LATHE

Sheldon Machine Co., Inc., has introduced a new high speed turret lathe for secondary

(Continued on next page)

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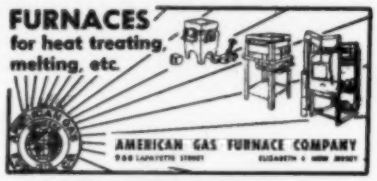
FURNACES for heat treating, melting, etc.



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SHOP EQUIPMENT NEWS

(Continued from previous page)

New High Speed 2nd Operation Hand Turret Lathe

operations as well as for production jobs.

The new turret lathe combines increased power and capacity with new modern styling and controls. The versatility of 13-in. swing over the bed ways and large 1 1/16-in. collet capacity makes the lathe ideal for both chucking and precision collet work.

Variable spindle speeds from 40 to 2000 r.p.m. are selected automatically by fast-slow push-button controls. Actual spindle speeds are read from built-in tachometer in the headstock.

The lathe has a production type hand-lever collet attachment with 1 1/16-in. collet capacity. There is a six station ram turret that accommodates up to 1-in. shank turret tools.

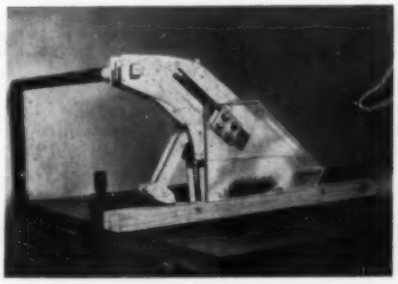
A heavy-duty cross slide with front and rear tool blocks has screw-operated wedges for easy height adjustment of cutting tools. T slots in the slide permit universal adjustment of both tool blocks.

A complete range of production accessories is available, including air operated bar feeds, air operated collet and chucking attachments, coolant systems, step chucks and closers, two-speed motors and controls.

(For further details encircle index code 0610)

SAFETY GLIDE GUARD FOR CIRCULAR SAW

General Scientific Equipment Company have developed a revolutionary new gliding-action safety guard for use on any table model circular saw, which lets the user see all work operations clearly through transparent plastic shields.



Safety Glide Guard for Circular Saw

(Continued on page 22A)

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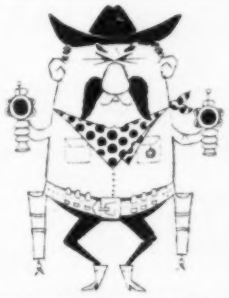

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Code No.		Page No.
60	**Adjustable Clamp Company**.... Jorgensen and pony clamps.	10A
61	**Alondra Sales, Inc.**..... Free wall chart on fuel pressure regulation. Use coupon page 29A.	29A
62	**American Gas Furnace Co.**..... Heat treating equipment.	28A
63	**American Technical Society**..... Research Report. Use coupon page 16A for on approval copy.	16A
64	**American Wood Type Mfg. Co.**.. Free catalog on graphic arts equipment and supplies.	28A
65	**Armstrong Bros. Tool Co.**..... Drop forged clamps.	21A
66	**Atlas Press Company, The**.... New clausing 10" saw.	7A
67	**Bedford Lumber Co.**..... Knockdown cedar chest and aromatic red cedar lumber.	28A
68	**Beseler Company, Chas.**..... Overhead projector.	25A
69	**Black and Decker Mfg. Co.**..... 7" Sander-grinder.	12A
610	**Brodhead-Garrett Company** ..... School shop benches.	3rd cover
611	**Bruce Publishing Company**..... Fabricating with formica.	9A
611A	**Bruce Publishing Company**..... Professional books	30A
612	**Can-Pro Corporation**..... Aprons and coats.	26A
613	**Chandler & Price Co.**..... Presses and paper cutters.	18A
614	**Chilton Company**..... Automobile engine rebuilding and maintenance.	29A
614A	**Chilton Company**..... Automotive job sheets.	29A
615	**Cincinnati Tool Company, The**... Complete line tested tools.	27A
616	**Constantine & Son, Inc., Albert**.. Catalog of woods, tools and materials.	28A
617	**Copper Shop, The**..... Enamel-on-copper idea book.	28A
618	**Craftsman Wood Service Co.**..... Catalog of wood and woodworking equipment.	25A
619	**Delta Power Tool Div. Rockwell Mfg. Co.** ..... Power Tools. Free industrial catalog.	5A
620	**Designers Company** ..... Castings for school projects.	26A
621	**Dietzgen Company, Eugene** ..... Drafting, surveying and printmaking supplies.	2nd cover
622	**DonJer Products**..... Project material.	28A
623	**Driscoll & Co., Martin**..... Printing inks.	28A
624	**Duro Metal Products Co.**..... Power tools. Use coupon page 19A for catalog, etc.	19A
625	**Foley Lumber Company, T. A.**... Lumber.	28A
626	**Foley Manufacturing Co.**..... "Quick-Load" vise.	11A
627	**Formit** ..... Tools and materials for making hand wrought iron work.	25A
628	**General Finishes Sales & Service Co.** ..... Wood finishing with Sealacell process.	22A
629	**Gilbert & Miller, Inc.**..... New catalog.	26A
630	**Giles and Kendall Co.**..... Knockdown cedar chest and aromatic red cedar lumber.	26A
631	**Greenlee Tool Co.**..... Auger bits, chisels, gouges.	10A
632	**Greenlee Tool Co.**..... Hollow chisel maintenance folder.	16A
633	**Hamilton Manufacturing Co.**.... Arts and crafts furniture.	17A
634	**Hammett Company, J. L.**..... Handicraft supplies. Free catalog.	28A
635	**Hardwood Corp. of America**.... School shop lumber.	26A
636	**Kassel & Co., L. H.**..... Lamp parts and electrical supplies.	26A

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION
400 North Broadway, Milwaukee 1, Wisconsin

June, 1958

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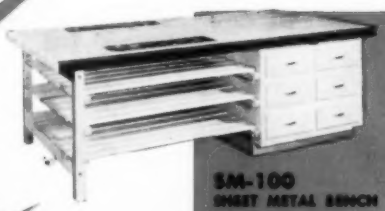
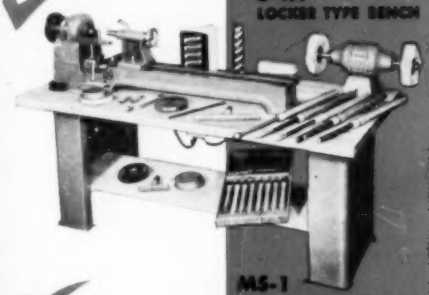


SM-100
SHEET METAL BENCH

L-4A
LOCKER TYPE BENCH



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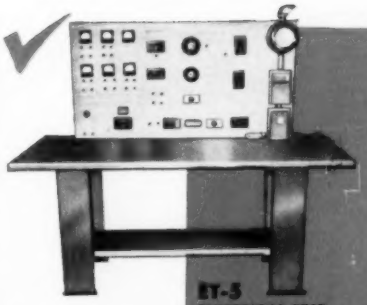
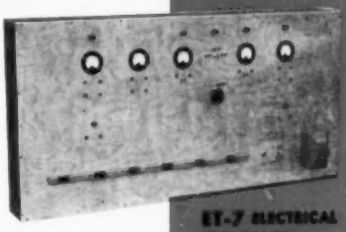


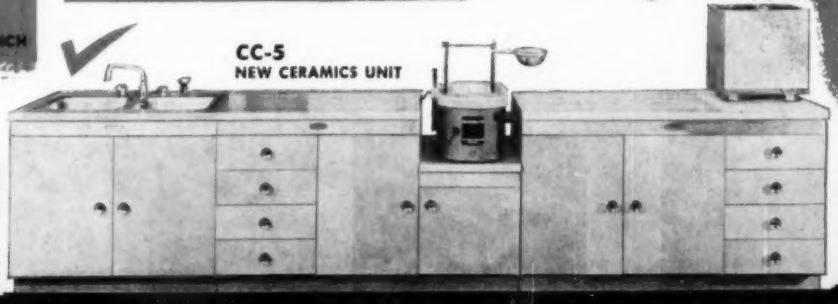
ET-5
ELECTRICAL TEST PANEL

TS-1
TOOL STORAGE CABINET



ET-7 ELECTRICAL TEST PANEL

E-1
ELECTRICAL OR CRAFT BENCH



CC-5
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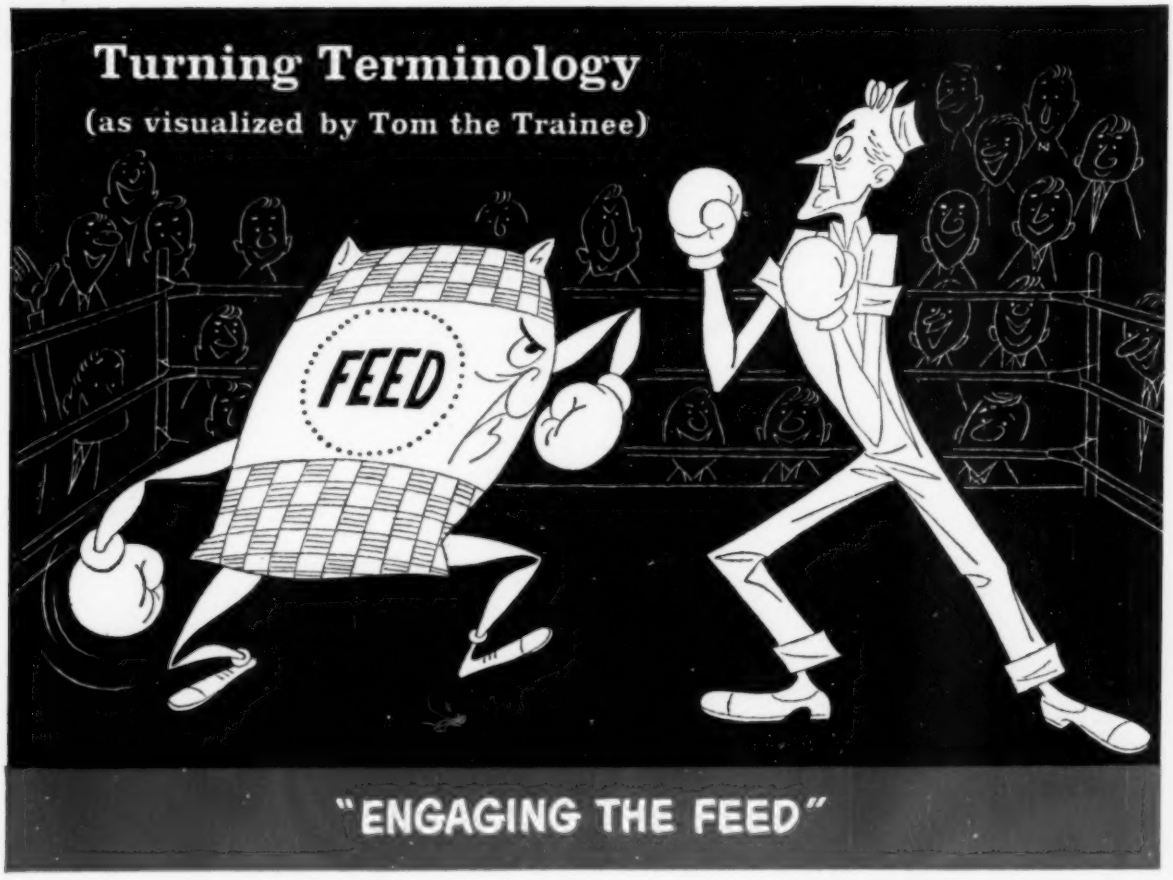

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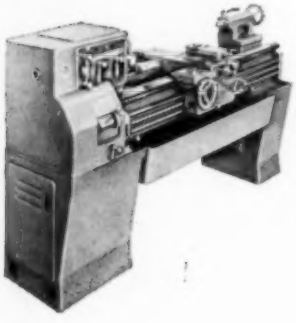

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